

# **Government Inquiry into The Auckland Fuel Supply Disruption**

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August 2019



## Preface

On 14 September 2017, the pipeline that brings diesel, petrol, and jet fuel from Marsden Point Oil Refinery into Auckland ruptured. It leaked jet fuel into rural properties and stopped the transmission of fuels into Auckland for 10 days. The rupture resulted from damage caused by a digger when it was being used to dig for kauri logs some three years earlier. No one had been informed at the time that the pipeline had been struck, and over time, the pipe weakened and eventually ruptured.

If there was to be a rupture, it was lucky that it happened when and where it did. The location was easy to access and not in a highly populated area, so the containment and repair could be carried out quickly, with a minimum of risk to people. Had there been the more flammable petrol in the pipeline at the time of the rupture, rather than jet fuel, there would have been a significant risk of fire and explosion, and the fuel would have been harder to contain. In addition, it was lucky that the rupture occurred outside peak air travel times and at a time when the jet fuel tanks at the Auckland end of the pipeline were near capacity, which meant the airport had available close to the maximum amount of jet fuel possible to be used while the pipeline was repaired.

In short, the consequences could have been far worse than they were.

The incident raised awareness and was a reminder that the fuel supply chain infrastructure is nationally critical infrastructure. The pipeline supplies almost all of Auckland's diesel and petrol, and is the only supply of jet fuel to Auckland Airport. Fuel companies were able to transport petrol and diesel into the Auckland area by truck from other parts of the country. However, there was no equivalent alternative route for jet fuel. Airlines flying out of Auckland Airport had to limit their use of jet fuel to 30% of their usual usage, which caused significant disruption to flights to and from Auckland.

Our task was to look at what lessons we might take from this incident, to determine what steps could be taken to improve the resilience of Auckland's fuel supply in future. In doing so, we followed current international definitions of "resilience". Our work therefore examined measures to prevent problems, planning and preparedness; the adequacy of the response and recovery efforts; and whether we could see evidence of adaptation and learning for the region to grow and thrive.

The report makes several recommendations on how the sector can better prevent, prepare for, respond to, and recover from an incident. In particular, we consider it essential that government and industry work together to put in place and regularly practise sector-wide response plans, to improve the response to any future incident.

Most significantly, we found that Auckland's jet fuel supply is currently not sufficiently resilient, when assessed against the specific resilience standards we developed during our work, and from a public interest perspective.

With only a single supply chain for jet fuel, a single point of failure at any point along that chain can cause a complete disruption of supply to Auckland Airport. There is limited storage near the airport to provide cover for an outage and the number of days of cover that storage provides is decreasing as the daily demand for jet fuel grows. This means our vulnerability is increasing.

In addition, parts of the infrastructure near the airport are now operating close to capacity. In its current state, parts of the supply chain will not be able to meet basic demand in a few years' time, let alone recover from, or provide resilience during, an outage of any significant size.

We have concluded that there is a need to invest in further infrastructure without delay, to achieve an acceptable level of resilience. Investment is needed now to ensure that:

- capacity in the supply chain near the airport will be able to meet the increasing demand; and
- there is sufficient cover for an outage event.
- Ideally, the industry would also develop a second permanent supply chain.

The fuel supply chain infrastructure is largely owned or controlled by the three major fuel companies (BP, Mobil, and Z Energy) through complicated joint venture arrangements, with limited government

oversight or ability to intervene. The infrastructure we have has been able to meet demand to date largely because of investments made in previous decades.

As a market-led system, investment decisions seem to have been focused on meeting the demand curve on a “just in time” basis. This may not take adequate account of the interests of the wider community and stakeholders in maintaining a system with greater resilience to withstand rapid increases in demand or events that disrupt supply.

Most of the fuel companies agreed with the forecast growth of jet fuel demand. However, in our interactions with them, some were slow to link those forecasts to a need for further investment in infrastructure and to share information about their thinking on investment possibilities. The complexity of the ownership and joint venture structures, and the confidentiality arrangements between the different parts of the supply chain, made it challenging to have visibility and allow us to have confidence about future investment plans.

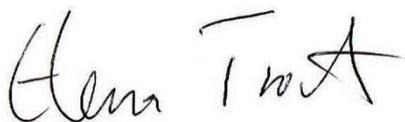
Towards the end of the Inquiry process, the fuel companies provided us with information showing that they are starting to consider infrastructure investment options; however, the plans are still preliminary. In our view, the fuel companies have failed to make timely investments to achieve and maintain the level of resilience in the supply chain that we regard as appropriate. BP told us that it disagrees with this view, because it considers that a cost benefit analysis of the specific options should be completed before finalising a view on the appropriate resilience standards. We address this point in chapters 3 and 18 of the report.

In our report, we have identified what we believe are appropriate and measurable minimum standards of resilience, taking into account the wider community interests. We have recommended a number of actions designed to encourage timely investment to meet and maintain these standards. These include steps to increase the transparency of demand forecasts, capacity constraints, and investment plans; and to develop a legislative framework to give government the power to step in if industry does not invest sufficiently to meet the required standards.

We wish to acknowledge and thank all the parties who met with us, provided information and submissions, and participated in the workshop and forum held by the Inquiry.

The Inquiry is indebted to Nicola White, Kirsty Pringle, and Danielle Kelly, as well as our two Counsel Assisting, Philip Skelton QC and Tom McKenzie. Michael Groesz and Bronwyn Buck of Fueltrac Pty Ltd contributed their expertise. We also wish to thank Bankside Chambers for their helpful assistance.

This incident was a timely reminder of how important this fuel supply infrastructure is for Auckland and New Zealand. Ensuring the ongoing resilience of such infrastructure needs regular consideration and action. We hope that New Zealand will learn from this incident and improve its ability to prevent, prepare for, respond to, and recover and learn from any future disruption to Auckland’s fuel supply.



Elena Trout



Dr Roger Blakeley

16 August 2019

## Summary

The aim of this Inquiry was to improve the resilience of the fuel supply to Auckland. The report begins by describing the fuel supply chain and explaining how we approached the question of resilience.

### The fuel supply chain

A single supply chain delivers most of the fuel that Auckland uses. In summary:

- imported crude oil is shipped to Marsden Point, where it is processed into a range of products at the Marsden Point refinery;
- the Refinery to Auckland Pipeline (RAP) transports two grades of petrol, diesel, and jet fuel 170 kilometres from the refinery to a storage facility at Wiri on the outskirts of Auckland;
- petrol and diesel are trucked from Wiri to customers and retail outlets;
- jet fuel is transported along a short pipeline from Wiri to Auckland Airport (the WAP), where it is stored in tanks at the Joint User Hydrant Installation (JUHI);
- from the JUHI, a hydrant system moves the jet fuel to the airport apron, where it is pumped into aeroplanes.

Three major fuel companies (BP, Mobil, and Z Energy) own, control, or have exclusive use of all the infrastructure making up this supply chain, through a complex series of joint ventures and commercial agreements.

An independent fuel company, Gull NZ, imports refined petrol and diesel to its storage facility at Mount Maunganui and trucks the fuel from there to Auckland and other parts of the North Island. BP and Mobil also bring in petrol through Tauranga. Other independent companies also supply a small amount of ground fuels.

### Resilience

Resilience is a broad concept with many competing definitions in the literature. The Inquiry drew on definitions used by the Ministry of Civil Defence and Emergency Management and the Rockefeller Foundation 100 Resilient Cities Project, which between them encompassed all the different stages of activity that make up a resilient system and the different types of stresses and shocks that a system needs to be able to cope with. As a result, the Inquiry looked at:

- prevention;
- planning and preparation;
- response;
- the ability of a system to deal with both acute shocks (such as the sudden rupture of the RAP) and gradual stresses (such as increasing demand);
- whether we could see evidence of a system that learns from experience; and
- whether the system was aiming to provide a platform for the region to grow and thrive.

### Lessons from the 2017 outage

#### *What caused the pipeline to rupture?*

The Inquiry established with reasonable certainty why the rupture occurred and how the RAP was damaged.

The pipeline ruptured on an unoccupied property in rural Ruakākā. It had been damaged by something mechanical that had struck it and created gouges. Refining NZ had carried out a technical inspection of the integrity of the whole pipeline in July 2014, so the damage must have occurred after that time.

We established that a 16-tonne digger was working on the Ruakākā property between 26 August and 28 August 2014. It was delivered there so that a contractor could look for swamp kauri logs on the property. The landowner had given him permission to dig but had warned him not to dig in the back paddock, which contained the pipeline. However, a neighbour saw the digger working in the area above the pipeline.

Although the contractor denied it, we were satisfied that he struck the pipeline with the bucket of the digger and damaged it. He then left and the digger was later collected. The landowner returned to find that the property had been left with many holes over it, including a large hole in the back paddock over the area of the pipeline. Using his own small digger, the landowner put some soil in the holes, to patch them up as best he could. Two months later, the company that owned the large digger brought it back again to carry out more repairs to the land. The landowner told us that he had not realised the pipeline had been exposed and damaged because it was not visible when he returned to the property. He said it did not occur to him to tell anyone about the digging.

Almost exactly three years later, on 14 September 2017, the pipeline ruptured where it had been damaged and jet fuel escaped into several properties.

We investigated whether any other factors had contributed to the eventual rupture. In particular, we considered whether:

- the pipeline had been properly operated and maintained;
- the project in 2016–2017 to increase the operating pressure of the pipeline might have contributed; and
- Refining NZ should have carried out a technical inspection of the condition of the pipeline before it began increasing the operating pressure in 2017.

We concluded that Refining NZ operated the pipeline in keeping with its legal requirements and standard industry practice; the increase in the operating pressure may have accelerated the failure of the damaged section of pipe but was not otherwise relevant; and there was no reason for Refining NZ to carry out an additional inspection of the pipeline given the information it had on its condition.

In short, the RAP had been operated properly. It ruptured because it had been hit by a digger operated by contractor looking for swamp kauri in August 2014. The contractor did not report the damage to anyone. The landowner was not aware that the pipe had been exposed and struck.

### ***Protection of the RAP***

Prevention of damage or incidents is the first part of ensuring resilience. The Inquiry therefore carefully examined the steps taken to prevent damage to the infrastructure making up the main fuel supply chain.

As the petroleum industry is a dangerous one, the industry has very high standards for safety. There are strong systems in all the workplaces in this supply chain, and built into the design of the infrastructure, to prevent incidents. Our review of the prevention measures focused on the RAP, given its role in the 2017 outage. It is a complex system to protect, given that it crosses 170 kilometres of rural and urban land.

Substantial arrangements are in place to prevent and detect damage to the RAP, meeting and sometimes exceeding standard industry practice. These include:

- legal restrictions on activities in the area above the pipeline and a permit system for people wanting to carry out controlled activities;
- communication activities to make sure landowners and occupiers know about the pipeline and the restrictions on what can be done above it;
- regular communication with others who might be working in the area, such as contractors, construction companies, and local authorities;
- a 24-hour, seven-day-a-week telephone helpline;
- a free “beforeUdig” service to help people locate underground pipes and cables before they excavate;
- “in-line” inspections of the pipeline; and
- surveillance activity, including vehicle patrols, aerial inspections, and foot patrols.

### ***The changes we have recommended***

No matter how good a system is, there is always room for improvement. Refining NZ has been actively exploring some possibilities and we have identified others. We have recommended that Refining NZ, with its contractor First Gas, works to strengthen its relationships and communication with landowners, occupiers, neighbours, and the local communities so that they can act as its “eyes and ears” along the RAP. We have also recommended that they explore ways to improve the effectiveness of the surveillance activity, especially the aerial inspections.

We agree with Refining NZ that there is a case for expanding the legal protection of the RAP, using the tools in the Resource Management Act 1991. We note that Refining NZ is assessing whether it would be useful to increase the land area covered by the designation. We have made a specific recommendation to support their work to assess the type of national direction under the Act that would be best suited to protecting the RAP.

We have also recommended that the Government should develop legislation to create a statutory regime to protect networks such as this fuel supply chain and other critical infrastructure, based on the Gas Supply Act 1996 (NSW) and the Submarine Cables and Pipeline Protection Act 1996. A regime of this kind would give the network owner or operator, and law enforcement agencies, greater power to intervene to stop unauthorised activity. It would also create specific criminal offences. Until such a law is in place, we have recommended that Refining NZ and First Gas develop protocols with the relevant local authorities and regional police about how to respond swiftly when enforcement help is needed.

### **The response to the 2017 outage**

The Inquiry looked at three separate aspects of the response to the 2017 outage:

- the physical response to the rupture itself, namely the steps taken to control the leak, repair the pipe, restore supply, and remediate the environmental damage;
- the coordination and communication efforts across the fuel sector, with government, and with customers and others potentially affected by the disruption in supply; and
- the steps taken to manage supplies of fuel during the outage.

### ***Fixing the pipeline***

We found that Refining NZ's work to respond to the leak, repair the pipe, and remediate the damage was of a high standard. Their work was swift, well coordinated, careful, thorough, and effective. We also acknowledge the support and assistance provided by First Gas, BP, Mobil, Worley Parsons, and Lloyd's Register.

The information we gathered showed a mixed picture for the other two aspects of the response.

### ***Communication and coordination***

In any crisis, clear communication and effective coordination are an important part of the response effort. The information gathered by the Inquiry showed that the many public and private sector organisations involved in the 2017 response worked hard to keep each other informed of developments and to coordinate their efforts. Even so, it was clear that there were communication difficulties over the first few days of the outage.

We identified several matters that contributed to those early difficulties:

- In our view, Refining NZ was too optimistic in its early message, over the first 24 hours, that resolving the outage would take 24–48 hours. This was based on their assumption that the problem was a pinhole leak that could be repaired easily. As soon as they had seen the damage, Refining NZ provided clear and accurate information regularly to all those who needed to know. However, we consider that the initial message and later change added to the uncertainty in the first two days.
- We also concluded that there was no shared understanding about the appropriate level of response, which affected the way people approached the need to share information and coordinate.
- There were ongoing difficulties in gathering and collating data on fuel stocks to build a bigger picture of the issue and plan for any further contingency. We found that the sharing of fuel stock information could be improved by putting in place clear, agreed, and tested protocols for obtaining this information during a crisis.

Some of these points have already been identified by the Ministry of Business, Innovation and Employment (MBIE) in its own review of the response effort. We consider there is scope for MBIE to take more of a leadership role for the sector in any future crisis and we encourage them to continue working on the improvements identified in their review and this report.

### ***Managing fuel stocks***

The other part of the response effort in 2017 was to find ways to keep Auckland supplied with fuel of all types. We found that Refining NZ, the fuel companies, and other organisations with a role all responded quickly and creatively to this challenge. They explored a number of options, some of which proved not to be workable and some of which were useful. The successful initiatives were to:

- truck ground fuels in from other North Island ports, particularly Mount Maunganui;
- bring more diesel in to Wynyard Wharf and distribute it from there;
- build a new truck-loading facility for jet fuel at the Marsden Point refinery, facilities to receive jet fuel from trucks at Auckland Airport, and truck jet fuel directly to the airport; and
- convert some chemical storage tanks at Wynyard Wharf to be able to hold jet fuel, bring a shipload of jet fuel from Marsden Point to the wharf, and truck the fuel from there to the airport.

As a result, stocks of ground fuels were sufficient throughout the outage, with only a small number of retail outlets running out of higher grades of petrol. However, diesel stocks were getting low by the end of the outage.

The jet fuel tanks at Wiri and the airport held good amounts of fuel when the pipeline ruptured, but not enough to last the whole period. Only modest quantities of jet fuel were able to be brought in to the airport using trucks from Marsden Point and Wynyard Wharf, and only as the pipeline repairs were being completed.

The main response for jet fuel, therefore, had to be rationing. Once the full extent of the damage to the pipeline was understood, the fuel companies limited all airlines to 30% of their normal daily amount. Airlines used various strategies to manage, including flying in fuel from other airports, refuelling flights at other airports, reducing loadings on aeroplanes, rescheduling flights, and cancelling them as a last resort.

However, there were limits to what could be achieved. The limits arose from the lack of any existing:

- alternative supply chain for jet fuel; or
- established contingency arrangements that could be triggered as soon as the need arose.

The lack of an alternative supply chain is a major infrastructure question that we consider in Part E of the report. The lack of practical contingency arrangements in place was of more immediate concern to us. It meant that the sector had to start from scratch in identifying and implementing solutions. They had to come up with ideas, work out what additional equipment or modifications were needed, get all parties involved to agree, find properly trained people, obtain regulatory approvals or waivers, test the equipment and procedures, and more, before they could start to operate. As a result, the back-up supply arrangements only started to operate as the pipeline was fixed.

In our view, much of this work could and should have been done in advance. We regard the fact that this had not happened as part of the lack of robust sector-wide preparation, planning, and practice for a fuel supply problem.

We also highlight that the main back-up supply option for jet fuel that emerged in 2017 – shipping fuel to converted tanks at Wynyard Wharf – is no longer available. The tanks on that wharf are being removed as part of the redevelopment of Auckland's waterfront.

### ***The changes we have recommended***

The 2017 outage was a useful test of the fuel sector's response systems. It showed us that all parties swung into action quickly and responded well at a practical level. However, there were problems at a "whole-of-sector" level, relating to communication, coordination, contingency planning, and preparation. We have made recommendations designed to ensure these problems do not occur in any future outage, including the need:

- to complete the new National Fuel Emergency Plan;
- for MBIE to take a strong leadership role in making the new Plan effective, including organising regular sector-wide practice exercises to test it;
- for the Fuel Sector Coordinating Entity (Fuel SCE), which is at the centre of any response effort to take on a broader role, to meet regularly, oversee a project on information-sharing protocols, and coordinate sector discussions on contingency planning and preparation.

All parties told us that they supported these initiatives.

## **The resilience of the infrastructure**

We worked with information on forecast demand for the different fuels provided to us by the parties. We chose to concentrate on the ability of the infrastructure to keep pace with the forecast demand through to 2030.

We assessed the resilience of the supply chain infrastructure by looking at the following standards:

- Diversity of supply (all fuels): are there at least two fuel supply chains from port to market?
- Days of total cover from storage versus resupply time (all fuels): what is the gap between the number of days of normal fuel consumption that would be covered by the fuel stored in the total supply chain, and the number of days it would take to bring more fuel from overseas?
- Storage close to market (jet fuel): how many days of jet fuel consumption would be covered by the fuel stored at or near the airport?
- Input supply capacity versus peak day demand (jet fuel): does the total input capacity to the JUHI (from the pipeline and trucking) exceed 110% of the peak day jet fuel demand?

### ***Ground fuels***

We were generally satisfied with the resilience of the infrastructure that provides grounds fuels to the Auckland region. There are multiple supply chains, which is a strength from a resilience perspective.

For petrol, there is sufficient storage in the system to manage demand. The system for supplying petrol of all grades is sufficiently resilient, now and through to 2030.

For diesel, the amount of cover provided by the storage at Wiri is forecast to decline as demand increases through to 2030. The latest forecasts show cover falling below three days more often at the low point of the supply cycle, and the removal of the diesel storage tanks at Wynyard Wharf will reduce the resilience of the supply system for this fuel. We have recommended that the fuel companies monitor the situation closely and make timely decisions on investment in new infrastructure, to ensure sufficient resilience in the infrastructure supplying Auckland with diesel.

### ***Jet fuel***

We are not satisfied with the resilience of the infrastructure making up the supply chain for jet fuel. Without investment, the resilience will quickly decrease further, given the forecast demand for jet fuel.

The lack of a permanent alternative supply chain is a basic weakness in the system. Although several parties are considering ways of creating an alternative supply chain, that work is in its early stages. Any second supply chain would require substantial capital investment; the market participants would have to work out whether it was commercially viable. We also identified barriers to new entrants trying to join the jet fuel market, which further reduces the likelihood of an alternative supply chain being established.

Drawing on expert advice and discussion with the fuel sector during our work, we have concluded that the appropriate resilience standards for the current supply chain infrastructure are:

- storage capacity at Wiri and the JUHI sufficient to provide 10 days of cover for operations at 80% of normal activity, based on the average of the 30 non-contiguous peak days across a year; and
- input capacity to the JUHI of 110% of peak day demand.

Applying the storage capacity measure, the current storage at Wiri and the JUHI is not adequate and the level of cover will continue to decrease if no new tanks are built.

Applying the input capacity measure, the pipeline from Wiri to the airport does not provide sufficient capacity on its own. In addition, it has nearly reached the limit of its capacity and soon will not be able to meet forecast demand. Making up the input capacity shortfall by trucking additional fuel from Wiri to the JUHI is possible and would bring the input capacity above the range for a few years. However, the current traffic constraints at the airport mean this is unlikely to be a satisfactory option, other than for modest quantities or in exceptional circumstances.

In our view, investment decisions are needed without delay, to build additional storage tanks at Wiri and the JUHI, and to increase the input capacity into the JUHI.

We are satisfied that Refining NZ is making appropriate investment decisions to maintain the capacity of the refinery and the RAP to meet future demand.

We are not satisfied that the three fuel companies that own Wiri, the WAP, and the JUHI will make timely investment decisions to build the infrastructure needed. Although they have recently begun to consider the issue and options, they are still some way from making firm commitments to invest, despite all those facilities already falling below what we regard as appropriate capacity measures.

### ***The changes we have recommended***

We have recommended the following measures to promote change and encourage the parties to find ways to invest in additional infrastructure more promptly:

- mechanisms for the parties involved in jet fuel supply for Auckland Airport to regularly share information on capacity constraints and pressure points, demand forecasts, linkages, security of supply, and investment plans;
- Auckland Airport monitoring the developing international trends in the way JUHI facilities are being owned and managed, to inform how and where it establishes the new JUHI that will be needed under its redevelopment plans; and
- encouraging the fuel companies to make the necessary investment decisions without delay.

However, we have also recommended that the Government legislate to put in place a menu of regulatory options so that it can step in if the market participants are not able to make the needed decisions in a timely way. Those options might include compulsory disclosure of information on usage, forecasts, capacity, and investment plans; mandatory performance standards for the infrastructure, based on those we have identified in this report; and requiring open access to the relevant infrastructure, or a co-regulatory model such as the one operating in the gas industry in New Zealand.

We consider the Government should monitor progress on the matters we have identified and consider that information together with the final report from the Commerce Commission's study on the retail fuel sector, which is due at the end of 2019. If the sector does not make progress on its own, the Government may be able to facilitate a solution through non-legislative means.

If investment is still not forthcoming, the Government should consider using the statutory powers we propose, to require the market to address the problem.

### **Our overall assessment**

Returning to the assessment of the resilience of the fuel supply system for Auckland in its broadest sense, we have concluded that it needs strengthening in several ways:

- More could be done to protect the infrastructure and try to prevent damage to it.

- Better preparation and planning for coordination and contingency arrangements is needed, in case there is another significant outage.
- There is an urgent need to build more resilience into the infrastructure for keeping Auckland Airport supplied with jet fuel.

We have recommended actions in all these areas. If these steps are taken, we believe that the overall system will continue to serve Auckland and the country well.

## Recommendations

### To better protect the RAP and other infrastructure, we recommend:

1. *Update the law on operating standards*  
That MBIE updates the Health and Safety in Employment (Pipeline) Regulations 1999 so that the legal requirements match the current industry standards on pipeline operations.
2. *Improve communication with landowners*  
That Refining NZ continues to work to find cost-effective ways to establish and maintain direct personal contact with landowners or occupiers, such as by developing the role of the RAP liaison officer, or by strategic use of email, messaging services, and social media.
3. *Improve communication with neighbours and the community*  
That Refining NZ works to find cost-effective ways to:
  - include neighbours who live close to the pipeline in their communication activities; and
  - interact with the general public in the communities living along the RAP, informing them about the dangers, the restrictions, and what to do if they have concerns.
4. *Improve the surveillance activity*  
That Refining NZ continues to work to find cost-effective ways to:
  - increase the effectiveness of its surveillance activity, especially aerial surveillance – for example, by changing to note all material soil disturbance over the RAP and follow up with the records of permits issued (and landowners as needed) to assess the level of risk; and
  - use technological advances to introduce new surveillance systems as they become available and practical.
5. *Expand the protection of the RAP under the RMA*  
That the Ministry for the Environment works with MBIE and the Treasury, in consultation with Refining NZ, to assess the type of national direction under the RMA that might be most suitable for creating better protection of the RAP and similar networked infrastructure.
6. *Create offences for damage to infrastructure*  
That the Government directs MBIE and the Treasury to develop proposals for legislation to create a statutory regime to protect networks and other critical infrastructure in New Zealand, based on the Gas Supply Act 1996 (NSW) and the offences in the Submarine Cables and Pipeline Protection Act 1996.
7. *Put in place protocols with enforcement agencies*  
That Refining NZ, First Gas, WorkSafe New Zealand, relevant local authorities, and regional police work together to put in place protocols with these agencies on how to respond in situations in which urgent action is needed.

### To support better planning and preparation for a crisis, we recommend:

8. *Complete the new National Fuel Emergency Plan*  
That MBIE and MCDEM complete their work on the new National Fuel Emergency Plan which should include a specific section on jet fuel, and issue it by the end of 2019.
9. *MBIE should actively lead the work to make the new Plan effective*  
That MBIE has clear responsibility for providing proactive leadership in giving life to the new Plan, by convening regular meetings of the Fuel SCE, organising exercises to test the Plan, taking the lead in ensuring it is updated regularly, and coordinating and supporting the work programme needed to make the Plan effective.
10. *The Fuel SCE should have a broader role*  
That MBIE broaden the role of the Fuel SCE, drawing on the model provided by NOSEC in Australia.

11. *The Fuel SCE should meet regularly*  
That MBIE convene a meeting of the Fuel SCE within three months after the Plan has been issued and broaden its role as a forum for building relationships, knowledge, and trust between the industry and government organisations. All potentially relevant industry parties should be included in the initial meetings.
12. *The Fuel SCE should oversee a project on information sharing protocols*  
That MBIE develops and tests the information-sharing protocols needed to support the new Plan, including clarifying any competition law issues. The Fuel SCE should oversee this work.
13. *The Fuel SCE should coordinate sector discussions on contingency planning and preparation*  
That the Fuel SCE has a standing agenda item on contingency planning and preparation activities that require sector engagement (e.g., the assessment of the proposed mobile skid facility). In the short term, it should oversee a work programme on the preparation steps that emerged from the 2017 outage.

**To encourage timely investment in the infrastructure making up the fuel supply chain, we recommend:**

14. *Auckland will need additional storage tanks for diesel*  
That the fuel companies:
  - closely monitor the resilience of the arrangements for supplying diesel to Auckland; and
  - give early consideration to what investment in new storage tanks will be needed to maintain an appropriate level of resilience, while recognising the multiple supply chain routes to the Auckland region.
15. *Auckland Airport updates demand forecasts and shares them*  
That Auckland Airport establish a system to have its demand forecasts regularly updated and to share them with the fuel suppliers, airlines, officials, and other interested parties.
16. *Auckland Airport convenes a jet fuel supply coordination forum*  
That, having regard to the findings in this report, Auckland Airport convene a jet fuel supply coordination forum, similar to the one operating at Brisbane Airport, to share information on capacity constraints and pressure points, demand forecasts, linkages, security of supply, and investment plans.
17. *Auckland Airport takes into account resilience when planning the new JUHI*  
That Auckland Airport monitor the developments taking place in Australia and overseas on the way JUHI infrastructure is being built, owned, and operated. This should help to inform the airport on the question of how the future JUHI should be structured, including whether the future JUHI should be operated on an open-access basis; whether there should be minimum standards for storage and input supply capacity stipulated in the ground lease; and whether the JUHI operator should have to disclose and consult over its future investment plans on a regular basis.  
The final decision about the location of the new JUHI should take into account resilience considerations, including that its location does not limit the options for fuel supply via pipeline, truck, train, or another method.
18. *The fuel sector commits to building new infrastructure*  
That the fuel sector make investment decisions without delay in order to enable work to start on the building of new infrastructure that takes into account the resilience-enhancing measures articulated in this report, including:

- diversity of supply;
- storage at or near Auckland Airport that provides at least 10 days' cover at 80% of operations, based on the average of the 30 non-contiguous peak days in a calendar year; and
- input capacity into the JUHI that exceeds 110% of peak days' demand.

The fuel sector should provide information on progress towards these decisions to all those with an interest (in particular, Auckland Airport, the airlines, and the Government).

19. *The Government legislates to put regulatory options in place*  
That the Government begin work immediately to develop and enact new legislation to put in place regulatory options that would enable it to step in should the fuel sector not be able to take into account the public interest in resilience adequately when making investment decisions relating to fuel infrastructure.
20. *The Government monitors progress and helps facilitate a solution if possible*  
That the Government:
- monitor progress on the matters identified in this report on quarterly basis, including monitoring jet fuel demand against the Inquiry's resilience standards and the plans for investment in fuel infrastructure, and consider that information together with the final report from the Commerce Commission's study of the retail fuel sector; and
  - consider what support it might be able to offer to facilitate an outcome if the sector has not made sufficient progress on advancing investment without delay.
21. *The Government intervenes, if the sector does not make progress*  
That, if the sector has not been able to make the necessary progress by 30 June 2020 by committing to the investment needed to bring this infrastructure up to the recommended resilience standards (for example, by making definite decisions to commit capital to relevant construction projects), the Government should take steps to intervene, using the statutory powers we have recommended.

## Glossary

Auckland Airport	Auckland International Airport Limited
Barg	A unit of pressure above or below atmospheric pressure
BARA	Board of Airline Representatives of Australia
BARNZ	Board of Airline Representatives New Zealand
BP	BP Oil New Zealand Limited
CBA	Cost-benefit Analysis
CDEM	Civil Defence and Emergency Management
COLL	Coastal Oil Logistics Limited
DPMC	Department of the Prime Minister and Cabinet
First Gas	First Gas New Zealand Limited (formerly Vector Gas)
FSWG	Fuel Security Working Group
Ground fuels	Collective term for diesel and the grades of petrol (91, 95 and 98)
Gull	Gull NZ Limited
Hydrant	A network of pipes taking jet fuel from the JUHI to plane fuelling points
IATA	International Air Transport Association
IEA Act	International Energy Agreement Act 1976
JUHI	Joint User Hydrant Installation
KRL	Kauri Ruakaka Ltd
MBIE	Ministry of Business, Innovation and Employment
MCDEM	Ministry of Civil Defence and Emergency Management
Mobil	Mobil Oil New Zealand Limited
MOT	Ministry of Transport
NCMC	National Crisis Management Centre, managed and maintained by MCDEM, situated below ground at the Beehive
NESO	National Emergency Sharing Organisation
NOSEC	National Oil Supplies Emergency Committee (Australia)
NRC	Northland Regional Council
NSC	National Security Committee of Cabinet
NZDF	New Zealand Defence Force
NZTA	New Zealand Transport Agency
NZX	New Zealand Stock Exchange
ODESC	Officials Committee for Domestic and External Security Coordination
RAP	Refinery to Auckland Pipeline
RMA	Resource Management Act 1991
SCE	Sector Coordinating Entity
Slate Committee	Committee that provides information to support Refining NZ in scheduling the fuel being sent down the RAP
Slate Scheduling Committee	Committee that makes scheduling decisions for COLL to transport fuel from Marsden Point to other ports around New Zealand
Vector Ltd	Operates the high-pressure gas pipeline within Auckland
WAP	Wiri to Auckland Pipeline
WOSL	Wiri Oil Services Limited
Z Energy	Z Energy Limited
Z Energy 2015	A subsidiary of Z Energy Limited which bought Caltex, Chevron New Zealand's service station network

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## Part A: Background

### 1 Introduction

#### Why the Inquiry was established

- 1.1 On 14 September 2017, the underground fuel pipeline that brings petrol, diesel, and jet fuel from the Marsden Point Oil Refinery to Auckland ruptured. The pipeline shut down automatically as soon as its systems detected the sudden loss of pressure.
- 1.2 The site of the rupture was found quickly. It was in a paddock in Ruakākā, just a few kilometres from the refinery. At the time, the pipeline was transporting jet fuel, which leaked into the paddock. Refinery staff immediately began work to contain the leak and potential environmental damage, and to excavate to find out the extent of the damage.
- 1.3 It took 10 days to repair the pipeline. During that time, it could not be used to transport fuel to Auckland. The region had to manage with the fuel that was already in storage tanks around Auckland or could be transported in by other means.
- 1.4 The stocks of ground fuels (the different grades of petrol and diesel) already in Auckland, along with supplies brought in by truck from Marsden Point and the Port of Tauranga, proved adequate to keep industry and fuel retailers supplied. A small number of retail petrol stations ran out of some of the more specialised stock towards the end of the outage.
- 1.5 Auckland Airport was harder hit. The fuel companies rationed the airlines to 30% of their normal usage from Sunday 17 September.<sup>1</sup> The airlines took steps such as flying in aeroplanes full of fuel without passengers, filling up at nearby airports (for example, in Christchurch, the east coast of Australia, and some Pacific islands), reducing the weight on planes by postponing cargo, and cancelling some flights. All these steps to reduce the impact came at a cost.<sup>2</sup> Some of the travelling public were inconvenienced and some businesses suffered significant losses. Even so, the outage was over within 10 days and the city quickly returned to normal.
- 1.6 During our work, we heard that several factors made this incident relatively easy to deal with and manageable in its consequences:
  - The pipeline contained jet fuel at the time of the rupture, which is much more stable and non-combustible than other fuels. If it had ruptured when carrying petrol, there would have been more risk of environmental damage, the formation of a vapour cloud, and an explosion. That was particularly relevant at this Ruakākā site, because the same trench contains a natural gas pipeline and there are power lines overhead. An explosion at this site could have damaged all of these.
  - The rupture site was reasonably close to the refinery, on level ground, and easy to access, so staff and emergency crews were able to get there and respond quickly. If the rupture had happened in a more remote or inaccessible location, containing the spill and repairing the pipe would have been much more difficult.
  - The outage happened at a quiet point in the travelling calendar, outside all holiday periods (when passenger numbers are higher). The peak season begins in December, at which point demand for

<sup>1</sup> The allocation was raised to 50% on Friday 22 September, 80% on Monday 25 September, and then returned to 100% on Saturday 30 September.

<sup>2</sup> See the discussion in chapter 11.

jet fuel is much higher and a loss of supply would have been more difficult for the airlines to manage.

- When the outage occurred, the jet fuel tanks at the Wiri storage facility were full. One storage tank at the airport was out of service, but overall, jet fuel stocks in Auckland were good. If the outage had happened at another point in the supply cycle (for example, if a tank had been low and waiting to be filled, or if one had been out for service), the available stocks would have been much lower.

1.7 The incident raised questions about whether the current arrangements for supply left New Zealand's major city too vulnerable to disruption. There was particular concern about the risks for the supply of jet fuel to the country's main international airport, Auckland Airport. The Government established this Inquiry because the outage highlighted that the fuel supply can be vulnerable to disruptions and that effective risk management practices and contingency plans need to be in place.

### What the Inquiry covered

1.8 The Inquiry was established by the Minister of Energy and Resources, Hon Dr Megan Woods, by a Gazette notice on 6 December 2018. The terms of reference stated:<sup>3</sup>

*The purpose of this Inquiry is to draw lessons from the RAP [Refinery to Auckland Pipeline] outage to inform how the fuel industry and the Government could improve the resilience of fuel supply in the Auckland region.*

1.9 To do this, the terms of reference required us to inquire into:

- the cause(s), contributory factor(s) and impacts of the RAP outage;
- the operational responses to the outage; and
- the relevant operational and risk management practices of Refining NZ, fuel suppliers, airlines, national and regional civil defence and emergency management (CDEM) organisations, and any other relevant parties.

1.10 Taking into account what we learned about the outage and its impact, the Inquiry was then required to "report and make any recommendations it sees fit regarding the resilience of fuel supply in the Auckland region, and any other relevant matters".

1.11 We could not inquire into, or report on, issues of criminal or civil liability.

1.12 The Inquiry was initially required to report within six months of its establishment. However, the Inquiry was given an extension to complete its work by 19 August 2019.

### Why this issue is important

1.13 The whole supply chain that we examined is critical infrastructure for New Zealand. It is recognised as nationally significant in many reports assessing the state of New Zealand infrastructure. For example, the New Zealand Lifelines Council identified all the components, from the Marsden Point wharf through to the jet fuel link at Auckland Airport, as "pinch-points": single sites that would cause a significant loss of national service if they failed.<sup>4</sup>

1.14 Auckland Airport was identified as another pinch-point, because it is the gateway for 75% of international visitors. In 2015, the *Thirty Year New Zealand Infrastructure Plan* noted that the airport's

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<sup>3</sup> The full terms of reference are set out in Appendix A.

<sup>4</sup> New Zealand Lifelines Council, *NZ Lifelines Infrastructure Vulnerability Assessment: Stage 1*, September 2017, p 5.

operations contributed \$3.5 billion to regional GDP and provided 33,100 jobs. Its long-term plans for investing in more infrastructure were expected to increase regional GDP by a further \$2 billion.<sup>5</sup>

- 1.15 In 2017, it was a pipeline that failed and it was repaired in less than two weeks. The disruption could have been worse if another part of the supply chain had failed, such as the storage tanks at Wiri or part of the Marsden Point refinery. The risks include contamination of a tank with faulty product; failure of a component; fire or explosion; and damage by external interference. Some of these events are more likely than others, and the operators of these facilities all take careful steps to minimise the risk. However, as events in Christchurch in March 2019 showed, even the risk of terrorist activity should not be discounted.
- 1.16 The Ministry of Business, Innovation and Employment (MBIE) commissioned a report on the economic effects of possible fuel supply disruptions.<sup>6</sup> The modelling in this report suggests that in the first six months after an event:
- a short-term refinery outage would result in a \$100 million loss for New Zealand;
  - a long-term refinery outage would cause a loss of nearly \$2.5 billion or 1.8% of GDP; and
  - a long-term disruption to the pipeline or the Wiri facility would cause a loss of nearly \$1.2 billion or 0.9% of GDP.
- 1.17 The modelling showed that all these scenarios would also produce a significant loss in welfare, to the extent that those losses can be quantified and modelled. A short-term disruption to the pipeline or the Wiri facility, like that in 2017, produces smaller consequences but still significant losses.<sup>7</sup>

### How we carried out this Inquiry

- 1.18 The Inquiry's work was made up of five broad stages.
- 1.19 In the preparation stage, we:
- received initial briefings from government agencies;
  - identified and consulted the relevant parties likely to be involved in our work and designated some of those as core participants under the Inquiries Act 2013;<sup>8</sup>
  - consulted on and published a List of Issues to guide our work;<sup>9</sup> and
  - held introductory meetings between the panel members and the major organisations involved.
- 1.20 We then moved into an information-gathering stage. As well as our own general research, this involved:
- sending out formal requests for information to 21 parties;
  - meeting with 18 parties to carry out formal interviews;
  - visiting the Marsden Point refinery and the site of the pipeline rupture;
  - visiting the Wiri site, which is the main fuel storage facility for the Auckland region;

<sup>5</sup> New Zealand Government, *The Thirty Year New Zealand Infrastructure Plan 2015*, p 25.

<sup>6</sup> Market Economics Research, *Economics of Fuel Supply Disruptions and Mitigations*, May 2019.

<sup>7</sup> See chapter 11.

<sup>8</sup> See Minutes 1 and 2, available at <https://www.dia.govt.nz/Auckland-Fuel-Line---Useful-information>.

<sup>9</sup> See Minutes 1, 2, 3, and 5, available at <https://www.dia.govt.nz/Auckland-Fuel-Line---Useful-information>.

- commissioning an independent expert engineer from Australia to review the way the pipeline had been operated;
- commissioning an independent expert from Australia to assess the resilience of the jet fuel supply chain to Auckland Airport and advise on options for improving it;
- holding a closed workshop with selected parties to discuss the expert's draft report on the resilience of the jet fuel supply chain;
- holding a three-day public forum with the parties to hear and discuss submissions on a narrowed list of issues;<sup>10</sup> and
- meeting with other government agencies in New Zealand and Australia working on related matters.

- 1.21 The Inquiry records its disappointment that two parties were not fully open with us while we were gathering information. On an issue that we regarded as important to our work – the question of whether a second supply chain for jet fuel might be established – BP and Mobil provided brief and general answers to our questions, both in the formal interviews with us on 2 and 10 May 2019 respectively, and in response to the information requests we made on 1 April 2019, using our statutory powers to require information. By contrast, in its information response and interview, Z Energy told us it was exploring the possibility of a second supply chain through the Port of Tauranga. Although Z Energy told us it had raised the possibility with the other two fuel companies and they were involved in its investigations, we were not told that they were full participants in a joint working group until sometime later.
- 1.22 In July, we learned that this working group had expanded its focus in May 2019 and begun to discuss possible investments to improve the resilience of the existing infrastructure. This was frustrating, given these were the exact issues the Inquiry had canvassed with the parties in previous months in the interview, workshop, and forum. The fuel companies knew these issues were central to our analysis and the report we were drafting. Once we had learned about the full scope of the working group and made specific requests for information about it using our statutory powers, all three companies provided that information promptly.
- 1.23 We then analysed the information we had gathered and prepared our own draft report. During this process, we sought further information from some parties.
- 1.24 The next stage was to consult relevant parties on the draft report, both to confirm its accuracy and to ensure that all those potentially affected by the findings and recommendations had an appropriate opportunity to comment. We carefully considered all the comments we received and went back to parties for further information where necessary.
- 1.25 We then proceeded to the last stage of our work, which involved revising the report in light of the comments we had received, finalising it, submitting it to the Minister of Energy and Resources by 19 August 2019, and providing her with a presentation on our findings and recommendations.

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<sup>10</sup> See Minute 5.

### The structure of this report

1.26 This report is written in five parts:

- Part A sets out background information to explain how fuel is supplied to the Auckland region, the history of how that infrastructure was built, and how it is now owned and operated. It also explains how the Inquiry approached the question of resilience as it carried out its assessment.
- Part B examines the causes of the pipeline rupture. It sets out what we have established about how the pipeline was damaged in August 2014, our views on whether aspects of its operation might have contributed to the eventual rupture, and whether the pipeline is adequately protected. It concludes with our views on what more should be done to protect it.
- Part C covers the response to the rupture in September 2017 against the backdrop of the arrangements in place at the time for responding to crises. It examines the physical response to the rupture, in terms of how the pipeline was repaired, the communication and coordination activities of all those involved, and the steps taken to manage fuel supplies during the outage. The final chapter in Part C discusses our views about what needs to be done to improve preparations for a future incident.
- Part D considers the technical resilience of supply systems that bring ground fuels to Auckland.
- Part E examines the technical resilience of the infrastructure that makes up the jet fuel supply system to Auckland Airport and the options and challenges for creating more resilience in the system.

## 2 How the Auckland region is supplied with fuel

### The overall supply chain

- 2.1 The main system for supplying all types of fuel to Auckland is shown in Figure 1. In summary:
- Ships bring crude oil to the wharf at Marsden Point, from either the New Zealand offshore oil fields or various overseas sources, where it is offloaded into storage tanks. Already-refined product is also sometimes brought into the wharf.
  - The **Marsden Point refinery** processes the crude oil into several different products – two grades of petrol, diesel, jet fuel, marine fuel oil, sulphur, and bitumen.
  - Petrol, diesel, and jet fuel (mainly for the Auckland region) are then sent down a 170-kilometre pipe to storage tanks at Wiri, on the outskirts of Auckland. It is a multi-product pipeline, so the different fuels are pumped one after the other in controlled batches. The interface of co-mingled product between each batch is separated and sorted on arrival at Wiri. The pipeline is called the **Refinery to Auckland Pipeline, or RAP**.<sup>11</sup>
  - The different fuels are then stored in tanks at the **Wiri** facility, or “terminal”. Wiri only receives product from the RAP. It has no facilities for receiving product from trucks into its tanks.<sup>12</sup>
  - Ground fuels (petrol and diesel) can be moved on immediately. At Wiri, they are loaded into trucks and taken to industry customers and retail petrol stations.
  - Jet fuel is sent along another shorter pipeline – the **Wiri to Airport Pipeline, or WAP** – to storage tanks at Auckland Airport.<sup>13</sup> Jet fuel has very strict quality standards. Every time it has been moved, it must be left to “settle” for around 24 hours and then tested to ensure it meets the quality specifications.
  - The airport storage tanks and underground hydrant pipeline systems are known as the **Joint User Hydrant Installation (JUHI)**. The jet fuel must settle and be checked again at these tanks.
  - The jet fuel is then transferred from the JUHI to the apron of the airport through the airport’s hydrant system, as well as by truck.
  - Separate pumping systems on the apron take the fuel from the hydrant to the wingtip of the aeroplane.
- 2.2 A separate company, Gull NZ Ltd (Gull), also supplies ground fuels to Auckland through its own separate supply chain. It imports refined fuel from overseas to its storage tanks at Tauranga. From there, it trucks fuel to its retail outlets around the North Island, including to Auckland. BP and Mobil also bring imported high-octane petrol to Auckland from the Port of Tauranga. There are also some other smaller independent retailers.

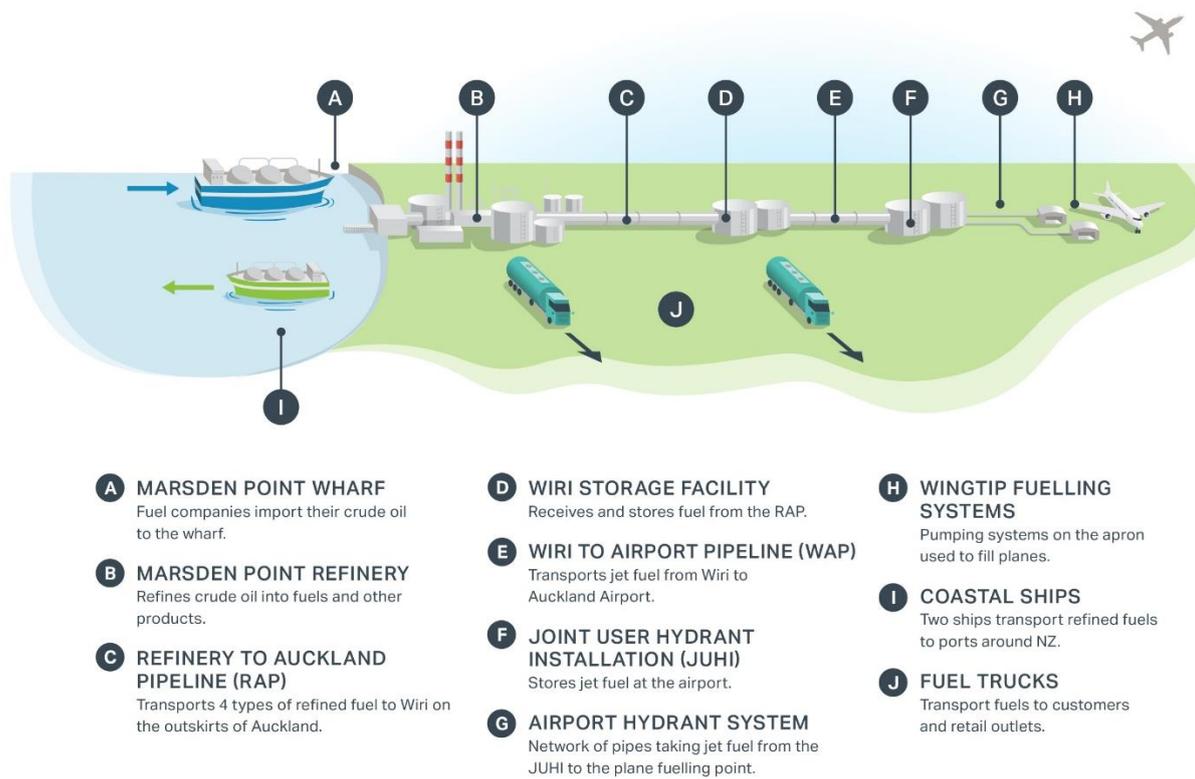
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<sup>11</sup> Fuel going to other parts of the country is sent by truck if it is going to Northland or shipped on two coastal tankers to other ports around New Zealand.

<sup>12</sup> Z Energy also has a biofuels storage facility at Wiri.

<sup>13</sup> Some jet fuel is also sent by truck to regional airports.

## 2 How the Auckland region is supplied with fuel



**Figure 1: The fuel supply chain for Auckland**

### The history of these assets and the petroleum sector<sup>14</sup>

- 2.3 The infrastructure making up this supply chain was built through a combination of public and private sector effort and investment, at a time when the petroleum sector was still heavily regulated. The following controls were placed on the sector:
- All wholesalers and retailers had to be licensed under the Industry Efficiency Act 1936. The Motor Spirits Licensing Authority issued site-specific retail licences, which were held in perpetuity.
  - The Motor Spirits Distribution Act 1953 required separation between wholesalers and retailers.
  - The Motor Spirits (Regulation of Prices) Act 1933 gave the Minister of Energy power to control the prices of all motor spirits by setting maximum and minimum prices. It allowed wholesalers a return of 13% on their assets.
  - Each year a government committee negotiated set prices for crude oil, refined products, and freight and coastal shipping.
  - The government set the refiner's margin, based on a formula that allowed the refinery to recover its operating costs, depreciation, and a 12.5% net return on shareholder's funds.
- 2.4 The result was that prices for the different fuel products were fixed a year in advance, with a single wholesale price at all ports and a single price at retail outlets.
- 2.5 By the late 1950s, the New Zealand government wanted the country to have its own refinery to save foreign currency, encourage the development of domestic industry, and give more fuel security. The international oil companies operating in New Zealand at the time were not interested initially, assessing the market as too small to support its own refinery. The government therefore needed to

<sup>14</sup> This history primarily draws on Pickford & Wheeler, *The Petrol Industry: Deregulation, Entry and Competition*, NZ Trade Consortium Working Paper No. 12, 2001.

## 2 How the Auckland region is supplied with fuel

offer some inducements. These included helping to find a suitable site and offering the possibility of market protection.

- 2.6 In 1961, the New Zealand Refining Company Limited (Refining NZ) was created to build a refinery in New Zealand. Its main shareholders were the five main fuel companies operating in New Zealand at the time (Shell, BP, Caltex, Europa, and Mobil). Between them, they held 68.57% of the shares, split according to their market shares at the time. The remaining shares were sold to the public and the company was listed on the New Zealand Stock Exchange. The company built the refinery at Marsden Point, which was commissioned in 1964.
- 2.7 In the 1970s, the Government approved several expansions to the refinery, because its production was not keeping up with growing demand. The international oil shocks of that decade were also causing concern. However, work did not start immediately, because neither the oil companies nor the government were keen to fund the expansions. In 1980, the Government agreed to give what was effectively a guarantee, allowing the necessary loans to be serviced through petrol pricing policies.
- 2.8 With this assistance, Refining NZ completed the expansion project in 1986, at a total cost of \$1.848 billion. It included expansion of the refinery and construction of both the Wiri tank facility to store fuel close to Auckland and the RAP to transport refined fuel from the refinery at Marsden Point to Wiri. The pipeline to transport jet fuel from Wiri to Auckland Airport (the WAP) was built around the same time.
- 2.9 Across that same period in the 1980s, deregulation was being considered on the basis that exposing the industry to market forces would promote efficiency and lower prices. The main concerns were that the domestic market might not be large enough to sustain a fully competitive market and that the Marsden Point refinery (the only refinery in New Zealand) might need special support to survive if it was competing with imported refined products.
- 2.10 In 1986, the Government introduced arrangements to take over the debts from the construction of the “Think Big” projects, including the refinery. In 1988, the Government agreed to support the refinery after deregulation with a lump sum payment of \$85 million spread over three years. That agreement enabled the Petroleum Sector Reform Act 1988 to be passed in May 1988. This Act removed all the previous controls over wholesale and retail activity.
- 2.11 The market is now fully deregulated and is controlled by the general laws governing all commercial activity in New Zealand. There are only two Acts specific to the petroleum industry in New Zealand: the International Energy Agreement Act 1976 and the Petroleum Demand Restraint Act 1981. Both date from the oil shocks of the 1970s and the significant international and domestic responses to these. Essentially, they make it possible to ration fuel in a crisis. Both Acts give the government significant powers to control the production, supply, and use of petroleum, but only if it has declared a petroleum emergency or shortage.<sup>15</sup>

### **How the main Auckland fuel supply chain is now owned and operated<sup>16</sup>**

#### ***Who owns what?***

- 2.12 The infrastructure assets that make up the main Auckland fuel supply chain are owned by a number of different organisations, although the three major fuel companies<sup>17</sup> operating in New Zealand have

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<sup>15</sup> Appendix C sets out a brief description of the main legislation relevant to the petroleum sector.

<sup>16</sup> A comprehensive description of the ownership and operating arrangements from 2016 can be found in *Z Energy Ltd and Chevron New Zealand* [2016] NZCC 10.

<sup>17</sup> There are effectively three major fuel companies in New Zealand: BP, Z Energy, and Mobil. Z Energy has a subsidiary company, Z Energy 2015 Ltd, which was formed as part of the process for Z Energy taking over

## 2 How the Auckland region is supplied with fuel

substantial ownership interests in all of them. The ownership arrangements are summarised below and in Figure 2.

- 2.13 Throughout this supply chain, the fuel itself is owned by the fuel companies. The various facilities in the supply chain process store and move it for the fuel companies and charge fees for those services, but the facilities do not take ownership of the product itself.
- 2.14 **Refining NZ** is a publicly listed company. The majority of its shares are owned by institutional investors and other members of the public, but BP, Mobil, and Z Energy own 42% of its shares between them (as at 31 January 2019). They each have a seat on the board. Refining NZ owns and operates:
- the refinery at Marsden Point, including a wharf at which oil and other product tankers can berth; and
  - the RAP.
- 2.15 The refinery is what is known as a “tolling” operation: the fuel companies that have their crude oil processed there and sent down the RAP pay a fee for the services. In principle, Refining NZ could process crude oil for any company, but in practice, the three shareholder fuel companies use all of its capacity.
- 2.16 At the refinery, a Technical Committee oversees optimisation and planning processes, including the allocation of capacity between the three fuel companies. It is made up of a representative from each fuel company and Refining NZ. It makes decisions by consensus.
- 2.17 A separate Slate Committee provides information to direct the scheduling, by Refining NZ, for fuel being sent down the RAP. It also comprises a representative from each fuel company, COLL, and Refining NZ. It makes decisions by majority.
- 2.18 At the other end of the RAP is the Wiri terminal. For historical reasons, the major fuel companies own the land and Refining NZ owns the terminal infrastructure (except for some later additions). The land is leased to Refining NZ and the land and terminal infrastructure is then leased back to the major fuel companies and to **Wiri Oil Services Ltd (WOSL)**, a company that was set up to manage and operate the facility’s day-to-day activities.
- 2.19 WOSL is a private company. Its shares are owned by Mobil, BP, and Z Energy. WOSL is restricted to operating the facility exclusively for the benefit of these companies and is not authorised to discuss possible hosting or through-putting arrangements with other parties. Effectively, all decisions at shareholder and board meetings must be unanimous.
- 2.20 The three fuel companies own the WAP through a joint venture agreement. They make policy decisions about the WAP through an Operating Committee. WOSL manages the WAP on their behalf.
- 2.21 **Auckland International Airport Ltd (Auckland Airport)** owns the land at the airport where the JUHI is located. Auckland Airport is a publicly listed company.<sup>18</sup> It leases the JUHI site to the joint venture that runs the JUHI. The lease expires in 2035.
- 2.22 **The JUHI joint venture** owns the tanks and other infrastructure that make up the JUHI facility on the land leased from Auckland Airport. The participants in that joint venture are Mobil, BP, and Z Energy. An Operating Committee made up of all the participants makes all decisions, other than minor matters

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Chevron in 2015–16. It owns some of the assets previously owned by Chevron, including the Caltex brand. For the Inquiry’s purposes, we treated the two Z Energy companies as a single group.

<sup>18</sup> Its largest shareholder is Auckland Council, which owns 22%.

## 2 How the Auckland region is supplied with fuel

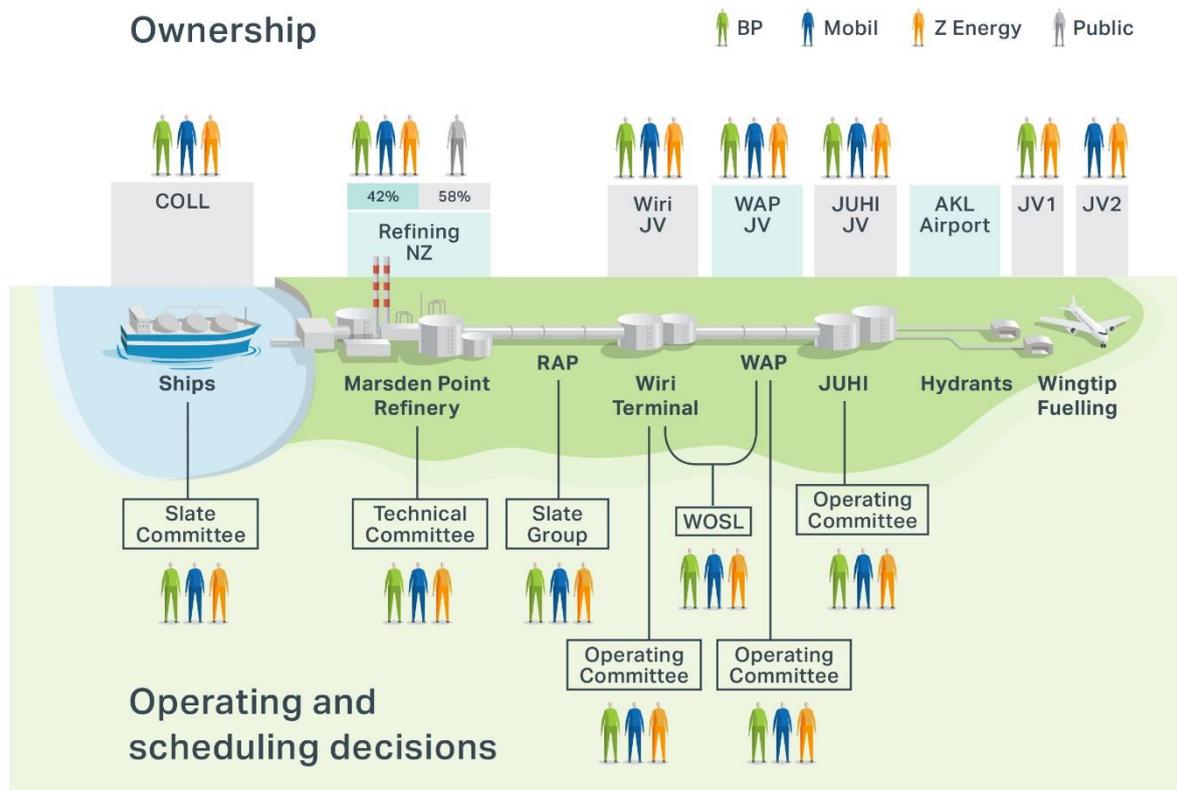
within the discretion of the operator. The three fuel companies used to take turns to operate the JUHI, but BP is now the long-term operator.

- 2.23 Auckland Airport owns the hydrant facilities that carry fuel from the JUHI tanks to the gates on the airport apron. Two further joint venture companies carry out the actual fuelling of aircraft “at the wingtip”. One is a joint venture between BP and Z Energy and the other is a joint venture between Mobil and Z Energy.
- 2.24 The other main parts of New Zealand’s fuel infrastructure relevant to Auckland are the two coastal tankers, a truck-loading facility at Marsden Point, and the trucks that transport fuel. These are part of the normal supply chain for diesel and marine fuel. They become more relevant to the supply of fuel to Auckland if there is a problem with the normal supply chain, as happened in 2017. Shipping services are provided by **Coastal Oil Logistics Ltd (COLL)**, which is a private company owned by, and operated under, a joint venture agreement between the three fuel companies. Again, scheduling decisions are made by a Slate Scheduling Committee made up of representatives from each fuel company and COLL.
- 2.25 Each fuel company organises its own trucking services. They own some fuel trucks themselves and contract trucking companies for the remainder of their needs.
- 2.26 The combined effect of these ownership arrangements is that the major fuel companies own, control, or have exclusive rights to use this entire infrastructure at present. For the Wiri terminal, the WAP and the JUHI, the Inquiry was told that the norm is for all the companies to reach unanimous agreement before any commitment to investment in new or enhanced infrastructure is made.<sup>19</sup> Each company must go through its own internal decision-making processes before it can bring a position to the relevant decision-making body. If the three companies’ individual decisions do not align, there is further discussion and each company must go back through its own processes again. As a result, major decisions can take some time.

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<sup>19</sup> There is a mechanism in the various agreements between them for investments to proceed when not all the parties agree, but the Inquiry was told that this has only been used once to date, when Z Energy invested in facilities to support biofuels.

## 2 How the Auckland region is supplied with fuel



**Figure 2: Ownership of the Auckland fuel supply chain infrastructure**

### **Competition and cooperation**

2.27 In economic terms, the supply chain is both:

- “vertically integrated”, meaning that the same companies own, control, or have exclusive rights to use all the parts of the supply chain, from importing oil, through processing, storage, and distribution, until the eventual sale of a product to a customer; and
- “horizontally coordinated”, because the ownership and joint venture arrangements at each point of the supply chain require the competing companies to work together.

2.28 This integration and coordination provides some benefits. Vertical integration means that the entire supply chain can quickly receive and respond to signals from consumers about demand or preferences. The horizontal coordination avoids duplication of expensive infrastructure, resulting in efficiency gains and cheaper prices for consumers.

2.29 In the absence of any sector-specific controls, the Commerce Act 1986 provides the main control on the activities of the fuel companies. This Act prohibits contracts, arrangements, or understandings that have the purpose or effect of:

- substantially lessening competition in a market;
- fixing prices;
- controlling supply; or
- allocating market share between participants in a market.

## 2 How the Auckland region is supplied with fuel

- 2.30 It also prevents a party from taking advantage of their market power to restrict entry to the market and prohibits resale price maintenance (controlling the price at which a supplier's goods are on-sold).
- 2.31 This Act is an important control, given how intertwined the activities and assets of the three major fuel companies are, both in New Zealand and internationally. The companies manage their activities very carefully to ensure compliance with competition laws across all the countries in which they operate. In particular, they maintain strong limits on the information that can be communicated or shared with other parties, both because of the information's commercial value to competitors and because of the need to avoid being perceived as collaborating and inhibiting effective competition.
- 2.32 The Commerce Commission oversees and enforces the Commerce Act. It has been carrying out a market study into the factors affecting the supply of retail petrol and diesel for land transport at the same time as this Inquiry has been carrying out its investigations. Its final report on that study is due in December 2019.

### Capacity of the fuel supply chain

- 2.33 Around 120,000 tonnes of crude oil is delivered to the Marsden Point wharf on a roughly weekly basis, as well as a small amount of refined fuels. The wharf has the capacity to receive more vessels than currently use it.
- 2.34 The refinery processes crude oil into a number of products, including petrol, diesel, and jet fuel. These fuels are then sent in successive batches down the RAP to Wiri (although some are distributed by other means). Jet fuel requires its own facilities, such as storage tanks, valves, pumps, and trucks. Modifications are needed before infrastructure can be changed from ground fuels to jet fuel.
- 2.35 Assessing the capacity involves two different measures: storage volumes (the amount of fuel that can be stored at each location, shown in millions of litres) and throughput capacity (the rate at which fuel can be pumped through each pipe).

### Ground fuels<sup>20</sup>

- 2.36 Table 1 shows the approximate capacity of the refinery, the RAP, and the Wiri terminal. Because the RAP transports several different types of fuel and the allocation of time to each can vary, it is hard to give a definitive figure for the capacity for a particular fuel. In this table, we simply give the throughput volume for that type of fuel in 2018.

**Table 1: Capacity of the infrastructure: ground fuels**

Facility	Diesel	Petrol (all grades)
Refinery production	2,150 million litres/year	1,900 million litres/year
Refinery: total available storage	114 million litres	142 million litres
RAP throughput	790 million litres/year	967 million litres/year
Wiri: total available storage <sup>21</sup>	24 million litres	56 million litres
Wiri: average working stock	12 million litres	20 million litres

<sup>20</sup> The base data we used in this section was sourced from information given to the Inquiry by Refining NZ and WOSL. We have converted all figures to millions of litres, for consistency.

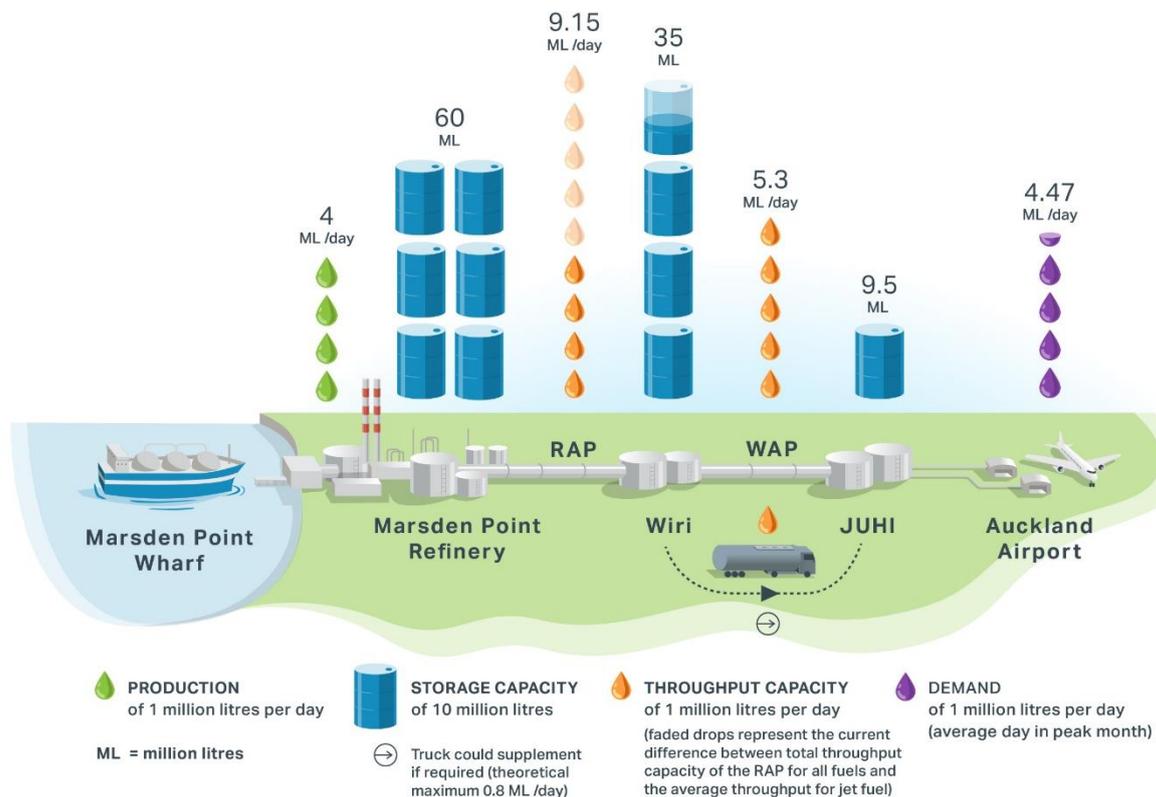
<sup>21</sup> Total available storage refers to the volume of the storage tanks available at the site. Average working stock is the average amount of fuel available for use at any one time.

## 2 How the Auckland region is supplied with fuel

- 2.37 At Wiri, there are six loading bays for trucks to load petrol and diesel. Trucks can load up ground fuels across all six bays, at a maximum rate of approximately 360,000 litres per hour.
- 2.38 There are plans to introduce a drag-reducing agent to petrol and diesel, subject to a trial planned for later in 2019. This agent would increase the RAP throughput by about 15%, depending on the product mix. This will free up more time for jet fuel to be transported down the RAP.

### Jet fuels<sup>22</sup>

- 2.39 Figure 3 shows the current capacity across the different parts of the jet fuel supply chain.



**Figure 3: Capacity of the infrastructure: jet fuel**

- 2.40 The refinery currently produces approximately 3.9–4.4 million litres of jet fuel each day, which is about equal to its optimum production capacity. The fuel companies supplement jet fuel when needed by importing refined jet fuel into Marsden Point, which Refining NZ may process if the sulphur content is too high.<sup>23</sup>
- 2.41 The jet fuel storage tanks at the refinery have a total volume of approximately 60 million litres, including both finished product and “sour jet” that is yet to have sulphur removed. The refinery intends to convert an 18 million litre diesel tank to store jet fuel, to meet increasing demand.
- 2.42 The RAP has capacity to pump jet fuel at a rate of 9 million litres per day. At present, it typically pumps jet fuel for 14 days in a 31-day month, with the other days being used for ground fuels. As noted in

<sup>22</sup> The base data in this section is sourced from information provided by Refining NZ, WOSL, and Fueltrac.

<sup>23</sup> It removes the sulphur so that the jet fuel can be sent down the multi-product RAP without creating problems for other fuels, particularly diesel. Jet fuel that includes sulphur can be used in aircraft without any problems.

## 2 How the Auckland region is supplied with fuel

paragraph 2.38, more time for jet fuel could become available if the pumping of ground fuels becomes more efficient – for example, by the introduction of a drag-reducing agent. This initiative follows on from several projects by Refining NZ to increase the RAP's capacity.

- 2.43 The Wiri facility has three jet fuel tanks with a maximum capacity of 35 million litres and an average working stock of 17 million litres.
- 2.44 The WAP has a current maximum capacity of 5.3 million litres per day. It has plans to upgrade the automation at the JUHI to allow continuous pumping, which will slightly increase the capacity to approximately 5.5 million litres.
- 2.45 It would also be possible for trucks to take jet fuel from Wiri to the JUHI to supplement the WAP. This system is called a trucking "bridge". This has not been necessary to date, but it is likely to be needed soon during periods of peak demand.<sup>24</sup> A recent test showed that trucks could transport approximately 800,000 litres per day. This test involved four trucks (eight drivers) running all day. This level of trucking would not be realistic for normal activity at the moment, given the disruption that trucks to the JUHI cause to traffic at the airport under its current configuration.

### Back-up options and other supply routes

- 2.46 As the 2017 outage showed, this Auckland supply chain does not exist in isolation. When supply is disrupted, other parts of New Zealand's overall fuel supply system become relevant.
- 2.47 For ground fuels, the fuel companies that usually send petrol and diesel down the RAP were able to load it onto ships at Marsden Point and transport it to Tauranga, the next closest port to Auckland with fuel tanks for receiving product from ships. From there, the fuels could be trucked to Auckland by diverting some of the fuel trucks operating in other parts of the North Island. It was possible to supply enough ground fuels through this alternative route to keep Auckland adequately supplied for the duration of the 2017 outage.
- 2.48 For jet fuel, which requires specialised tanks, trucks, and other facilities, there is no easy alternative supply route. The closest tanks capable of receiving jet fuel are in Wellington, but trucking jet fuel from Wellington would be time-consuming and would not provide the quantities needed (a jet fuel truck holds approximately 30,000 litres and it takes approximately 320,000 litres to fill an A380 aeroplane).
- 2.49 Therefore, during the 2017 outage, BP worked with the operators of Wynyard Wharf in Auckland, which had tanks that had been used for fuels before the RAP was built, to bring a shipload of jet fuel directly into that wharf. It took some time to obtain the necessary agreements and consents and to convert a tank back to jet fuel use, but that made it possible to truck 1.5 million litres of jet fuel from Wynyard Wharf to Auckland Airport. In addition, a small amount of jet fuel was trucked from Marsden Point.
- 2.50 The Wynyard Wharf route is no longer available, because the tanks at Wynyard Wharf are being removed as part of the redevelopment of the area for the America's Cup in 2021. We have not been able to ascertain whether any consideration was given to the effect on Auckland's emergency fuel supply options when the redevelopment decision was made.
- 2.51 In short, the 2017 RAP outage showed that there are proven alternative routes for bringing petrol and diesel to Auckland (trucking from Marsden Point and the Port of Tauranga) that could be scaled up if needed. However, there is no effective alternative way of bringing significant quantities of jet fuel to Auckland.

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<sup>24</sup> See interview with WOSL of 24 April 2019, and response from Z Energy to Inquiry's questions of 12 April 2019.

## 2 How the Auckland region is supplied with fuel

### Summary of our findings

- Auckland has one main supply chain that brings the different grades of petrol, diesel, and jet fuel from the refinery at Marsden Point to the storage tanks at Wiri, located on the outskirts of Auckland city.
- The major fuel companies own, control, or have exclusive rights to use all the infrastructure making up this supply chain, through a series of companies and joint ventures.
- The fuel industry in New Zealand is completely deregulated and market driven.
- There are proven and scalable alternative routes for bringing petrol and diesel to Auckland by truck, from Marsden Point and the Port of Tauranga.
- There is currently no effective alternative supply route for bringing significant quantities of jet fuel to Auckland.

### 3 What is resilience?

- 3.1 The purpose of this Inquiry was to draw lessons from the RAP outage to inform how the fuel industry and the Government could improve the resilience of fuel supply in the Auckland region. That required us to assess the resilience of the current fuel supply system.
- 3.2 In this chapter, we explain how we considered and defined resilience and the tools we used to assess it.

#### Defining resilience

- 3.3 Our approach to the concept of resilience was informed by the following comment from *The Thirty Year New Zealand Infrastructure Plan 2015*:

*Our asset management practices also need to include a stronger understanding of the resilience of our infrastructure networks at a national, regional and local level, especially key pinch-points and the degree to which different parts of networks are critical to overall performance. There is a need to increase the sophistication of how we think about resilience, shifting beyond a narrow focus on shock events or infrastructure failure and thinking more about interdependencies, levels of service and community preparedness.*<sup>25</sup>

- 3.4 There are many definitions of resilience. The two that we found most helpful were those used by the Ministry of Civil Defence and Emergency Management (MCDEM) in its National Disaster Resilience Strategy and the Rockefeller Foundation in its 100 Resilient Cities programme:

*Resilience is the ability to anticipate and resist disruptive events, minimise adverse impacts, respond effectively, maintain or recover functionality, and adapt in a way that allows for learning and thriving. In essence, it's about developing a wide zone of tolerance – the ability to remain effective across a range of future conditions.*<sup>26</sup>

and

*100RC defines urban resilience as the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience.*<sup>27</sup>

- 3.5 Each definition highlights a different aspect of the concept:
- The MCDEM definition encompasses all the different stages of activity that make up a resilient system: planning and preparation, prevention, immediate response, recovery, and adaptation and learning.
  - The Rockefeller Foundation definition specifically covers both acute shocks (sudden, sharp, disruptive events like earthquakes) and chronic stresses (gradual changes that weaken a system, like climate change).
  - Both definitions specifically extend beyond just managing and recovering from problems to include adapting, growing, learning, and thriving.

<sup>25</sup> New Zealand Government, *The Thirty Year New Zealand Infrastructure Plan 2015*, p 47.

<sup>26</sup> MCDEM, *National Disaster Resilience Strategy – Rautaki ā-Motu Manawaroa Aituā* (April 2019), p 2.

<sup>27</sup> <http://www.100resilientcities.org/resources/>, accessed 8 July 2019.

3.6 We considered all these aspects were relevant when considering Auckland’s fuel supply system. This meant that our assessment of overall resilience looked at:

- prevention;
- planning and preparation, as well as response;
- the ability of the system to deal with both acute shocks, such as the sudden rupture of the RAP, and more gradual stresses, such as the increasing demand for jet fuel;
- whether we could see evidence of a system that learns from experience; and
- whether the system was aiming to provide a platform for the region to grow and thrive.

**The qualities of a resilient system**

3.7 The Inquiry has summarised the qualities that a resilient system should have in Table 2. This summary draws on the framework developed by the Rockefeller Foundation and Arup International Development in the 100 Resilient Cities programme.<sup>28</sup>

**Table 2: Qualities of resilient systems**

<b>Learning from the past and acting in times of crisis</b>	<i>Reflectiveness</i>	The ability to learn from past experiences to inform future decision making and to modify standards and behaviours accordingly.
	<i>Resourcefulness</i>	The ability to recognise alternative ways of using resources to meet people’s needs during a shock or when under stress, which may include investing in capacity to anticipate future conditions.
<b>Designing systems and assets that can withstand shocks and stresses</b>	<i>Robustness</i>	Robust systems have infrastructure that is well conceived, well constructed, and well managed to withstand the impacts of events without sustaining significant damage or loss of function. This includes making provision to ensure that failure is predictable, safe, and not disproportionate to the cause of that failure.
	<i>Redundancy</i>	Spare capacity is created intentionally to accommodate disruption due to extreme pressures, surges in demand, or an external event. Redundancy includes diversity (i.e., the presence of multiple ways to fulfil a function).
	<i>Flexibility</i>	The ability to adopt alternative strategies in response to changing circumstances or sudden crises.
<b>Good governance and effective leadership that ensure investments and actions are appropriate</b>	<i>Inclusiveness</i>	Inclusiveness emphasises the need for broad consultation and the engagement of communities to create a sense of shared ownership or a joint vision to build resilience.
	<i>Integration</i>	Integration brings together systems and institutions, promoting consistent decision making and ensuring that investments in systems are mutually supportive to achieve a common goal.

3.8 During the Inquiry, the participants identified various mechanisms that enhance the resilience of a fuel supply chain. Many of these mechanisms reflect these qualities of resilient systems. For example, participants pointed to:

- identifying hazards and risk, and putting in place regulations, procedures, and mechanisms to prevent these from occurring;

<sup>28</sup> These qualities have been taken from two versions of the Rockefeller Foundation and Arup *City Resilience Framework – 100 Resilient Cities* (published in April 2014 and November 2015).

### 3 What is resilience?

- being prepared for an event by having contingency or business continuity plans that are practised regularly, and having the people, equipment, and means to execute these plans;
- adapting existing infrastructure and methodologies in response to lessons from events;
- increasing capacity of existing infrastructure, both for redundancy and to keep up with demand and future growth;
- having enough fuel storage in the system to reduce the impact of the disruption;
- having alternative methods of supply that can be deployed or scaled up in a fuel disruption; and
- holding sector-wide forums to identify future infrastructure requirements and coordinate investment planning.

#### The attributes of a resilient fuel supply system

3.9 The Inquiry engaged Fueltrac Pty Ltd (Fueltrac), an Australian-based consultancy firm with expertise in fuel supply systems, to:

- assess both the current resilience and reasonably expected future resilience of the infrastructure making up the fuel supply chain for Auckland; and
- recommend options to improve its resilience.

3.10 Fueltrac used the standards shown in Table 3 to carry out its assessment. It has previously used these standards with the Australian Government to assess the resilience of the fuel supply chain in various locations in Australia. These standards focus on system resilience qualities such as resourcefulness, robustness, redundancy, and flexibility.

**Table 3: Fueltrac’s resilience standards for assessing fuel security**

<b>Ground &amp; jet fuels</b>	<i>Diversity of supply</i>	This standard identifies whether there are at least two fuel supply chains from port to market. In the event of an unplanned disruption in the primary supply chain, the alternative supply chains should be capable of supplying a large portion of the market.
	<i>Days’ total cover (in seaboard storage and close to market) vs resupply time</i>	This standard measures whether the amount of fuel in storage is sufficient to meet the resupply time from a flexible international supply chain.
<b>Jet fuel only</b>	<i>Storage close to market (Wiri and Auckland Airport)</i>	This standard measures the capability of the market to accommodate an upstream disruption in jet fuel supply.
	<i>Input supply capacity vs peak days’ demand (Auckland Airport)</i>	This standard measures the capability of the supply mechanisms to meet peak demand while still allowing some capacity to cope with short-term shutdowns or delays. Specifically, the combined input capacity to the JUHI from pipeline and trucking bridges should exceed 110% of the peak days’ jet fuel demand.

- 3.11 During the Inquiry, some participants submitted that there was a conceptual difference between resilience and fuel security, with fuel security being concerned with reliability of supply (including considerations such as cost-effectiveness, usefulness, timeliness, efficiency, and safety). However, the Inquiry considered that fuel security fell within its definitions of resilience.
- 3.12 In applying these resilience standards, we focused on the forecasts of demand for fuel through until 2030. Although the forecasts we used looked out to 2040 or more, we considered that the data became less reliable beyond about 2030.

- 3.13 The application of these resilience standards to the Auckland region's supply chain is discussed in detail in Parts D and E of this report.

#### Where does a cost-benefit analysis fit in?

- 3.14 Many parties suggested to the Inquiry that we should be carrying out detailed cost-benefit work before making any recommendations for change. The Inquiry's terms of reference were silent on this point.<sup>29</sup>
- 3.15 The Inquiry reviewed the previous reports on fuel security commissioned by MBIE and its predecessors, which have assessed the costs and benefits of different options for additional infrastructure.<sup>30</sup> We also had the benefit of considering the May 2019 report prepared for MBIE by Market Economics, *Economics of Fuel Supply Disruptions and Mitigations*.<sup>31</sup> This report evaluated the economic consequences of five fuel outage scenarios<sup>32</sup> and the extent to which different quantities of additional fuel storage would mitigate the economic losses.
- 3.16 The authors of that report sounded a note of caution about how this type of work should be used:
- In CBA [cost-benefit analysis] studies, uncertain benefits (or costs) are often quantified simply as the expected monetary value – the calculated monetary benefits under each contingency, multiplied by the probability of that contingency occurring. The major difficulty with this approach, however, is that it does not account for people's risk aversion. There is ample evidence that in risky situations, many individuals will be willing to pay more than expected monetary benefits to avoid an adverse situation. The difference between the expected monetary benefits and willingness-to-pay is often termed the 'risk premium'.<sup>33</sup>*
- 3.17 The report noted the complexity of trying to determine an appropriate "social risk premium", especially in relation to disruption events. It concluded that the main contributions of scenario-based economic impact analyses are to:
- reduce uncertainty by helping to explore the causes, effects, and potential outcomes of disruption events; and
  - provide a common focus for debate on the appropriate level of societal investment in mitigation steps.
- 3.18 This Inquiry is a first step in a longer process. Our role was to provide an independent assessment of the current situation and recommend directions for change.
- 3.19 If the Government accepts our recommendation that they should develop legislative proposals to create regulatory options for the fuel industry, then the policy development process will include a full

<sup>29</sup> In fact, a requirement to carry out a cost benefit analysis in an earlier draft was removed, to reduce the timeframe for the Inquiry). See Cabinet Paper *Government Inquiry into the Auckland Fuel Supply Disruption: Terms of Reference and Financial Implications* (November 2018), para 29. This Cabinet paper is accessible on the Inquiry's website: <https://www.dia.govt.nz/Auckland-Fuel-Line---About-the-Inquiry>.

<sup>30</sup> See, for example, Hale & Twomey, *New Zealand Petroleum Supply Security 2017 Update*, September 2017; and the three reports that made up the 2012 Oil Security Review. These are all available at <https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-generation-and-markets/liquid-fuel-market/oil-security-in-new-zealand/#oilsecurity>, accessed on 7 August 2019.

<sup>31</sup> Market Economics, *Economics of Fuel Supply Disruptions and Mitigations* (Final Report, 24 May 2019).

<sup>32</sup> These scenarios are: (1) an international fuel disruption; (2) long-term refinery outage; (3) short-term refinery outage; (4) long-term disruption to the RAP/Wiri; and (5) short-term disruption to the RAP/Wiri.

<sup>33</sup> Market Economics, *Economics of Fuel Supply Disruptions and Mitigations* (Final Report, 24 May 2019), p 11.

### 3 What is resilience?

assessment of the costs and benefits of the various regulatory options in the normal manner.<sup>34</sup> The results of that assessment would be published to inform debate once a Bill is introduced to Parliament.

3.20 The fuel supply market in New Zealand is fully deregulated and controlled by the general laws governing all commercial activity in New Zealand. We acknowledge that until this Inquiry, the industry participants had not been thinking of resilience of the overall supply chain against a set of minimum resilience standards. For the reasons that we explain in chapter 18, it will be up to these industry participants to carry out a cost-benefit analysis of their own individual investment opportunities in the usual way, taking into account the Inquiry's minimum resilience standards.

3.21 We decided that it was not necessary or useful for the Inquiry to attempt to carry out that cost-benefit work itself, either in relation to possible legislative options or potential investments in particular infrastructure.

#### Summary of our findings

- The Inquiry's assessment of overall resilience of fuel supply for Auckland has looked at:
  - prevention;
  - planning and preparation, as well as response;
  - the ability of the system to deal with both acute shocks, such as the sudden rupture of the RAP in 2017, and with more gradual stresses, such as the increasing demand for jet fuel;
  - whether we could see evidence of a system that learned from experience; and
  - whether the system was aiming to provide a platform for the region to grow and thrive.
- We assessed the resilience of the current infrastructure by looking at:
  - diversity of supply;
  - days of total cover in storage in the supply chain versus resupply time;
  - the amount of storage close to the market; and
  - input supply capacity versus peak days' demand.

<sup>34</sup> See Cabinet Office, *CabGuide*, "Impact analysis and regulatory impact assessments", November 2017, available at <https://dpmc.govt.nz/publications/impact-analysis-and-regulatory-impact-assessments>; and <https://treasury.govt.nz/publications/guide/guide-cabinets-impact-analysis-requirements-html>, accessed 7 August 2019

## Part B: Why the pipeline ruptured

### 4 How the pipe was damaged

- 4.1 The first task the terms of reference set for the Inquiry was to examine the causes and contributory factors of the RAP outage.
- 4.2 This Part examines those questions, as follows:
- This chapter sets out what we learned about how and when the pipe was damaged.
  - Chapter 5 looks at whether there were any other factors arising from how the RAP was operated that might have contributed to the rupture.
  - Chapter 6 considers how the RAP is protected.
  - Chapter 7 discusses the lessons that we think emerged and the changes we think are needed.
- 4.3 In terms of resilience, these questions relate to prevention and whether enough is being done to avoid damage to this critical infrastructure.

#### Investigations in 2017

- 4.4 After the pipeline ruptured in 2017, Refining NZ commissioned technical assessments of the section of pipe that had been removed, to try to understand what might have caused the damage. The Northland Regional Council (NRC) also carried out an investigation into the incident to assess whether they had a basis for a prosecution for an unauthorised discharge under the Resource Management Act 1991 (RMA).
- 4.5 We reviewed those technical reports and NRC's investigation file. Between them, Refining NZ and NRC had reached a view that the damage had been caused by someone excavating to look for swamp kauri logs, in the second half of 2014, as follows:
- They knew that the damage must have happened after July 2014, when Refining NZ had last inspected the pipeline with an "intelligent pig"<sup>35</sup> and no damage to the integrity of the pipeline had been identified.
  - The gouges on the damaged section of pipe were consistent with it having been struck several times by the bucket of a large digger.
  - From interviews with the landowner and others, NRC found that the landowner had given permission for someone to use a digger to look for swamp kauri logs on the property in 2014.
  - No other large digger had been on the property since 2014.
- 4.6 NRC was not able to establish an exact sequence of events or who might have been driving the digger when it struck the pipeline.

#### The swamp kauri industry

- 4.7 Swamp kauri is a unique and valuable wood, sourced from logs and stumps that have been buried and preserved in peat swamps, often for many thousands of years. Most swamp kauri is found in

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<sup>35</sup> A "pig" is a device that can be inserted into the pipeline and sent down it without stopping the flow of material through the line. A "cleaning pig" scrapes the side of the pipe as it travels down it to remove debris. "Inspection pigs" are fitted with technology that lets them scan the pipe as they travel down it, checking such things as corrosion, metal loss, and the general condition of the pipeline. These are commonly called "intelligent pigs".

## 4 How the pipe was damaged

Northland, where there used to be extensive kauri forests. Much of this land has now been converted to farmland.

- 4.8 Extracting swamp kauri is controlled by local authorities under the RMA. In Northland, it is a permitted activity as long as it is not in an indigenous wetland or removing indigenous forest. Kauri logs can be extremely large and some are buried several metres deep. Extracting the logs can be a major exercise requiring heavy machinery.
- 4.9 Swamp kauri must be milled at a registered sawmill, and only if the Ministry for Primary Industries has issued a milling statement for the timber. Milling statements are only issued if the wood has been salvaged without damaging indigenous forest land. The sawmill usually provides photographs and other information on the location to support an application for a statement. These controls mean that sawmills must work with the people who extract the logs so that they have reliable information on where the wood was found.

### **Our investigation into what happened in 2014**

- 4.10 To see if we could establish any further facts about the physical cause of the rupture and resulting outage, we engaged a private investigator to meet with relevant individuals on our behalf.<sup>36</sup>
- 4.11 The property where the pipeline ruptured is a small rural lifestyle block on the outskirts of Ruakākā. It was bought as bare land in October 2013 by the person who owned the land at the time (the landowner). He and his partner kept some horses on the property and a few cattle. In July 2014, they moved an empty house onto the property, which they intended to renovate and eventually live in. In the meantime, they were living in Waipū or staying on a boat at the Marsden Point marina, coming to the property regularly to care for their animals and work on the house.

### ***The approach from someone wanting to look for swamp kauri***

- 4.12 The landowner told us that shortly after the house had been moved there, a man approached him while he was at the property one evening. The man did not give his name. He asked if he could “scratch around” to look for swamp kauri logs on the property and indicated what any logs could be worth. This man was a contractor who would try to sell the swamp kauri he extracted and share the proceeds with the landowner. The landowner was interested, because he needed money to do up the house and thought there might be timber that he could use as well. He said that the man could look around.
- 4.13 The landowner knew that the RAP ran through his property and where it was (it is marked by signs on the paddock gates and painted fence posts). He recalls that he told the man about the pipeline and that he made clear he should not dig in that area.<sup>37</sup>
- 4.14 Receipts and invoices from local cartage companies show that a 16-tonne digger was delivered to the property twice that year. The relevant dates are shown in Table 4.

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<sup>36</sup> The investigator interviewed the landowner, the contractor who drove the digger, the manager of KRL, neighbours, and others with relevant information.

<sup>37</sup> The man told our investigator that he was not warned in this way. We assessed the credibility of each person and considered that the landowner’s recollection was likely to be more accurate.

**Table 4: Dates the digger was taken to and from the Ruakākā property**

26 August 2014	Digger transported from Mangawhai worksite to property at Ruakākā
28 August 2014	Digger collected from Ruakākā property and taken back to Mangawhai
25 October 2014	Digger transported from Mangawhai worksite to Ruakākā property again
6 November 2014	Digger collected from Ruakākā property and taken to the yard of Kauri Ruakaka Ltd

- 4.15 Kauri Ruakaka Ltd (KRL),<sup>38</sup> which is a local sawmill, owned the digger. The manager of KRL confirmed to our investigator that he arranged and paid for its transport on each of these occasions.<sup>39</sup> KRL sometimes bought kauri logs from the contractor.<sup>40</sup> KRL did not charge for the use of the digger or pay the contractor for his time.
- 4.16 The person from the transport company who delivered the digger to the Ruakākā property in August 2014 told us that he understood it would be used to look for swamp kauri. That is what was recorded on the relevant invoice.
- 4.17 Our investigator talked with two other property owners in a nearby area who had allowed the same contractor to dig on their land under similar arrangements. They had been approached in the same way and all the arrangements were based on “a handshake” rather than any written contract.

***The sequence of work on the property***

- 4.18 A neighbour told us that he saw someone using the digger right over the pipeline area around these dates, but he could not see the person driving it. He stopped his car and waved at the driver to indicate that he should stop but he did not know whether the driver saw him. He stopped at the top of the driveway to try to call the 0800 number on the sign there that warned about the RAP, to let them know what was happening, but the call did not connect. He did not follow up and try again later.
- 4.19 Our investigator spoke to the person who it seemed was likely to have been operating the digger. When NRC had spoken to this person during their investigation in 2017, he had said that he could not remember being there or working on the property. However, he confirmed to our investigator that he had been using the digger to look for logs on the property in August 2014 and that he had operated the digger in the area over the pipeline. He stated that he had only smoothed out the land in that area and he had not struck the pipe. He had not returned to the property after that.
- 4.20 The landowner told us that when he went to the property after the digger had gone, he was very angry at the way the land had been left. He said here were holes everywhere, which meant that it was not safe for his animals, and kauri stumps and logs had been left sitting there. He confirmed that there was a big hole near the pipeline, perhaps about 1 to 1.5 metres deep and over a large area. The pipe itself was not visible when he saw the hole. He said that it did not occur to him that he should tell anyone about the digging.
- 4.21 The landowner had a small digger of his own, which he used to fill up most of the holes as best he could. He pushed some topsoil into the big hole, but it was much too big for him to fill on his own.

<sup>38</sup> KRL is the current name of the company. It was previously called Oravida Kauri Ltd but its name was formally changed in April 2015. Documents show that both names were being used in 2014.

<sup>39</sup> We corroborated this with the relevant invoices and financial records, as well as information from the transport companies.

<sup>40</sup> KRL does not look for or extract swamp kauri itself. If others find logs that may be of value, they will approach the sawmill to see if it wishes to buy the logs.

## 4 How the pipe was damaged

4.22 We saw an email from the cartage company to KRL sent on 15 October 2014, before the digger's second visit. It records that the landowner's partner had just spoken to them, and:

*She wanted to know what was happening about the Kauri that was dug up on their property ... She was wondering if they were going to be picked up and when the paddock was going to be reinstated so she [could] graze her horses in that area.*

4.23 This email strongly suggests that the damage was done while the digger was being used at the property on its first visit between 26 and 28 August 2014. The return visit of the digger 10 days after this email was probably in response to this request to fix up the damage to the property.

4.24 Both the contractor and the KRL manager told us it was the manager who operated the digger when it returned in October 2014 to fix up the land. The manager told us that he only worked in the front paddock, not in the back paddock where the pipeline is.

4.25 There is nothing to suggest that a large digger, capable of excavating so deeply as to strike the pipeline, had been on the property since these events in 2014.

### Our findings on the cause

4.26 We concluded that it was highly likely that the pipeline had been struck by the contractor who operated the digger in the easement area between 26 and 28 August 2014. We think it is more likely than not that he knew what had happened, because the pipeline must have been struck quite hard and the impact would have caused noise and vibration. The sound of striking a metal pipe would have been quite different from hitting a buried log.

4.27 We inferred that the contractor had put some soil back over the pipeline to cover up the fact that he had hit it. He then left the property and did not return. Two days later, the digger was moved back to the Mangawhai site at which the contractor had been working previously.

4.28 The landowner later put some more soil in the hole. We accept that he did not realise that the pipeline had been exposed and damaged when he did this. The KRL manager brought the digger to the site again in October and reinstated the site more fully.

#### Summary of our findings

- Mining swamp kauri is an established industry in Northland.
- We have established with reasonable certainty that:
  - the pipeline was damaged by a digger between 26 and 28 August 2014;
  - the digger was operated by a contractor looking for swamp kauri logs;
  - it was more likely than not that the contractor realised he had struck the pipeline;
  - the contractor put enough earth back in the hole that the pipeline and the damage to it was not visible;
  - a neighbour saw a digger working in the area above the RAP and tried to call the 0800 number to alert the monitoring service, but the call did not connect;
  - the landowner had warned the contractor about the pipeline in the back paddock of the Ruakākā property before he started work; and
  - the landowner was not aware that the pipeline had been hit when he reinstated the earth as best he could.

### 5 Were there any other contributing factors?

5.1 We considered whether there were any other factors that might have contributed to the eventual rupture of the pipeline, some three years after it was damaged. In particular, we considered whether:

- the 2016–2017 project to increase the operating pressure on the RAP, so that it was able to transport more fuel, might have been relevant to the eventual failure of the damaged section of pipe; or
- Refining NZ should have carried out more inspections of the RAP – for example, before it increased the operating pressure – which would have helped it to detect the damage earlier and fix it before the pipeline ruptured.

#### How we assessed the maintenance and operation of the RAP

5.2 We engaged Fueltrac Pty Australia Ltd to provide us with an independent expert assessment on these questions and others. An engineer from Fueltrac with expertise in the petroleum industry reviewed the information and reports provided by Refining NZ, visited the refinery and the Wiri terminal, met with representatives from both companies, and met with an independent expert engaged by Refining NZ.

5.3 We asked Fueltrac to review what was being done against the legal requirements in New Zealand and standard industry practice.<sup>41</sup> The legal rules governing high-pressure pipelines of this kind are set out in:

- the Health and Safety at Work Act 2015 (which replaced the Health and Safety in Employment Act 1992); and
- the Health and Safety in Employment (Pipelines) Regulations 1999 (made under the old Act but continuing in force).

5.4 The Regulations require a pipeline to be built and operated in accordance with industry standards and specify four sets of formal Standards from which an operator can choose. Refining NZ has elected to follow AS/NZS 2885.3 (1997) Pipelines – Gas and liquid petroleum – Part 3: Operation and Maintenance (the 1997 Standard).

5.5 These standards are developed in Australia and adopted in New Zealand. We noted that the 1997 Standard that is listed in the regulation is out of date. In Australia, this standard has been revised twice and significant changes have been made. The Standard currently operating in that country was issued in 2012. Our understanding is that the 2012 Standard sets out current industry practice in Australia and New Zealand.

5.6 Our assessment work therefore took account of the New Zealand legal requirements in the Act, the Regulations, the 1997 Standard, and current industry practice as set out in the 2012 Standard.

5.7 We consider that New Zealand law should require the industry to meet the current industry standards. We recommend that MBIE should amend the relevant regulations to bring them up to date.

#### The project to increase the operating pressure

5.8 Across 2016 and 2017, Refining NZ carried out a project to increase the operating pressure of the RAP so that its carrying capacity would increase. The pipeline had operated at 87 barg from 1985 to 1999, which was under its maximum allowable operating pressure of 90.4 barg. In 1999, the operating

<sup>41</sup> Fueltrac Pty Ltd, *RAP Outage and Operations*, June 2019.

## 5 Were there any other contributing factors?

pressure was reduced to 75 barg after a second pumping station was installed at Wellsford. The project aimed to return the operating pressure back to 87 barg, to increase the throughput volume.

- 5.9 Refining NZ commissioned a number of technical reports on the options for improving performance, a stress analysis of the pipeline, a pressure surge analysis, and the condition of the pipeline. These reports, along with design plans and a hazard study, were submitted to the certifying agent, Lloyd's Register. In June 2017, Lloyd's accepted these as demonstrating compliance with the relevant standards and design parameters. Refining NZ increased the operating pressure of the RAP in five steps, between 28 June and 2 August 2017. The pipeline ruptured six weeks later, on 14 September 2017. At the time, it was operating at a pressure of 82–83 barg.
- 5.10 After the incident, independent engineers reviewed the operating pressure profiles for the three months before the rupture. They concluded that there had been no pressure surge events or times when the pressure had exceeded the maximum allowable surge pressure. Specialist engineers also analysed the damaged section of pipe. They concluded that the damage to the pipe had significantly reduced its capacity to withstand internal pressure so that, with repeated stress fluctuations over time, it eventually failed.
- 5.11 Fueltrac reviewed all this information. They noted:
- The pipeline was considered to be in better condition than the industry average from a corrosion point of view and was able to be operated safely up to a pressure of 87 barg, and that it was operating within its design limits.
  - The gouge made by the digger reduced the pressure the pipe could withstand, so that over time, a crack associated with the gouge propagated, leading to the eventual rupture.
- 5.12 In Fueltrac's opinion, it was likely that the increase in operating pressure increased the "magnitude of the stress fluctuations within the pipe" and so reduced the time it took for the damaged area to fail. However, it was not otherwise relevant to the failure. If the pipe had not been damaged, there was nothing to suggest that the increase in pressure would have led to a problem.

### **Should the pipe have been inspected before the pressure was increased?**

- 5.13 The 2012 Standard on pipeline maintenance requires periodic in-line inspections to identify factors that might affect the integrity of the pipeline.<sup>42</sup> We were told that these inspections are a significant investment of time and money: the equipment must come from overseas and the cost is around \$800,000 for each inspection. The frequency of such inspections is based on factors such as:
- the past reliability of the pipeline;
  - historical records;
  - current knowledge of the pipeline's condition;
  - the rate of deterioration (corrosion) of the pipeline; and
  - the statutory requirements.
- 5.14 The RAP had in-line inspections in 2006, 2009, and 2014. Based on the 2014 results, the next inspection had been set for 2019. In addition, as a precaution in response to successive and unusual wet periods, Refining NZ had scheduled an additional inspection for October 2017 to check for pipeline movements and areas of bending strain. This inspection took place in November 2017 and served as a post-incident inspection as well. A further and more accurate post-incident inspection took

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<sup>42</sup> AS 2885.3 (2012), Section 6.6 "Inspection Activities".

## 5 Were there any other contributing factors?

place in December 2017. Based on that data, the recommendation is for another inspection to be carried out in 2022.

- 5.15 Fueltrac reviewed the chronology of in-line inspections across the life of the RAP so far, along with the reports resulting from the more recent inspections. They concluded that the frequency of the in-line inspections was appropriate and in keeping with the 2012 Standard.
- 5.16 We specifically asked Fueltrac whether there was any reason for Refining NZ to have carried out an additional inspection before it began the project to increase the pressure in the RAP. They advised that, based on what was known about the condition of the pipeline at that time, there was no reason for Refining NZ to have been concerned and to consider such a step.

### **Our findings on the possibility of other contributing factors**

- 5.17 Based on the extensive information and analysis provided by Refining NZ, as well as the independent review of that material by Fueltrac, we have concluded that there were no other factors in the way Refining NZ operated and maintained the RAP that contributed to its rupture and the outage.
- 5.18 We set out in paragraph 5.5 that the legal requirements in New Zealand have not kept pace with changes in the industry standards. The New Zealand law refers to the 1997 Standard, which has now been revised twice. The industry currently works to a 2012 Standard, although we understand that is now being revised as well.
- 5.19 We are concerned by this situation. For something this important, for safety as well as the protection of nationally critical infrastructure, we think the law should not be allowed to become out of date. We draw this to the attention of MBIE, which has responsibility for administering the Health and Safety at Work Act 2015 and the standards-setting system in New Zealand.<sup>43</sup>

#### **Summary of our findings**

- The legal requirements governing the protection of pipelines in New Zealand have not kept pace with industry standards and they should be updated.
- The project to increase the pipeline's operating pressure was carried out properly. It may have accelerated the time at which the pipeline failed, but it did not contribute to the failure.
- The in-line inspections of the RAP were carried out in accordance with industry standards and there was no reason for Refining NZ to consider carrying out any additional inspection before it began to increase the operating pressure.

<sup>43</sup> Standards New Zealand, which manages the development of the relevant standards, is a business unit within MBIE.

## 6 Protection of the RAP

- 6.1 The Inquiry examined the systems in place in 2014 to 2017 to protect the RAP from damage by external interference. We wanted to assess whether there was anything more that might have been done to protect against or detect the damage that occurred.
- 6.2 We reviewed the information provided to us by Refining NZ and its contractor, First Gas Ltd, against the relevant law and the 2012 Standard. In May 2019, Refining NZ also provided us with a report on the same topic that they had recently commissioned from another Australian expert, GPA Engineering Pty Ltd.<sup>44</sup> We asked the pipeline expert assisting us to provide us with her assessment of the activities that protect the RAP. This activity is also governed by the legal requirements and standards set out in paragraph 5.3.
- 6.3 In this chapter we look at:
- the arrangements between Refining NZ and First Gas Ltd for protecting the RAP from damage from external interference;
  - the measures in place to try to prevent damage from occurring; and
  - the measures in place to detect risks or damage, once it has occurred.

### **Refining NZ's contract with First Gas Ltd<sup>45</sup>**

- 6.4 Refining NZ contracts First Gas Ltd (previously Vector Gas Ltd), which has considerable expertise in managing pipelines, to carry out many of the protection activities on its behalf. First Gas owns nearly 5,000 kilometres of gas distribution pipelines and 2,500 kilometres of high-pressure gas transmission pipelines in the North Island.
- 6.5 Because First Gas has a high-pressure gas pipeline in the same trench for most of the length of the RAP, it is efficient for First Gas to carry out these activities for both pipelines at the same time. The contract between Refining NZ and First Gas covers the length of the RAP, from Marsden Point to Wiri.
- 6.6 The parties have revised the contract periodically to change the services to be provided. The 2012 revision was the relevant contract in 2014 when the RAP was damaged. Since then it has been revised in late 2014, 2015, and 2018.

### **Measures to prevent damage**

#### ***Restrictions on activities above the pipeline***

- 6.7 Two mechanisms impose legal restrictions on what can be done above or close to the pipeline: easements over the land where the RAP is laid, and designations over the same area under the RMA:
- Refining NZ has legal easements over each title of land where the RAP is laid.<sup>46</sup> In rural areas, the easement is 12 metres wide (6 metres on either side of the pipeline). In urban areas and along road reserves it is 6 metres wide (3 metres on each side of the pipeline). The easement gives Refining NZ the right to enter the easement area to inspect and carry out work on the pipeline. It requires the landowner to ensure that, in the easement area, no trees or shrubs are planted and no structure is built without Refining NZ's consent. The surface can be used for agricultural or

<sup>44</sup> GPA Engineering, *Report into Refining NZ's Management of the RAP*, May 2019.

<sup>45</sup> The contract was originally with Vector Gas Ltd. First Gas purchased Vector Gas Ltd in 2016 and took over its responsibilities under the contract.

<sup>46</sup> An easement is a tool used in land law to give a person rights over land owned by someone else. It is recorded on the certificate of title of the affected land so that any purchaser will have notice of it.

pastoral activities, including digging to a depth of up to 0.375 metres, without consent. Consent must be sought for any deeper digging.

- Designations under the RMA to protect the RAP are included in the district plans of the relevant local authorities. They extend over much the same area as the easement (generally 12 metres wide, reducing to 6 metres within road and rail corridors) and require a person to obtain consent from Refining NZ before erecting any building or structure on the designated corridor, putting up a fence or other improvement that extends more than 0.4 metres below ground, or doing anything on the land that could endanger the pipeline or inhibit its operation.<sup>47</sup>

6.8 On behalf of Refining NZ, First Gas assesses and issues the permits to people who seek consent to carry out a restricted activity in the easement or designation area. It also oversees any such work. If it becomes aware that someone has carried out restricted work without a permit, First Gas will try to contact them to explain the need for a permit.

### **Communication activities**

6.9 As well as imposing legal restrictions on what can be done on the land, the easement and designation serve a communication purpose. Having an easement on titles to land means that any purchaser of land is likely to be informed about the RAP and the restrictions on what can be done in the area at the time of purchase. The designation, shown on district plans available to the public, means that others who might engage in excavation or construction activities are able to find out about its location as well.

6.10 First Gas carries out a number of tasks to communicate more directly with landowners and occupiers. It does this for its own pipeline in the easement and on behalf of Refining NZ for the RAP. First Gas:

- maintains a database of property owners and monitors changes in ownership;
- asks new landowners to provide contact details for occupiers;
- mails a safety information pack to new landowners and occupiers, as well as further safety information twice a year;
- provides a landowner liaison service; and
- carries out an annual phone survey of a sample of landowners (since 2018).

6.11 First Gas also communicates with others who might become involved in work on the land that could affect the pipe. First Gas:

- maintains a database of contractors working in relevant areas and sends them safety information on a regular basis;
- maintains contact with local authorities so that it can advise Refining NZ about any relevant subdivision or land use consents;
- provides a free 24-hour, 7-day-a-week phone service for emergencies and to help with third-party work on pipeline easements; and
- supports the “BeforeUdig” service, which is a private service that enables anyone planning excavation work to get information on any underground pipes or cables that might be in the area.

6.12 Along the length of the RAP, signs and notices identify where it is located and state that there is a dangerous pipeline below ground. The signs are on the gates at the entrance to paddocks, on north- and south-facing fences that cross the easement, and at the roadside. When the RAP runs across

<sup>47</sup> Refining NZ told us that achieving this designation was a significant project that took five years.

paddocks, the fenceposts on each side of the pipeline are painted white to indicate where the pipeline runs. In urban areas, the signs are attached to independent stands, power poles, and kerbs.

- 6.13 A marker or warning tape is also laid in the trench along the entire length of the pipeline, about a metre above the pipe itself, so that if someone digs there, they will see the warning tape before they reach the pipe.

### ***How the communication worked for the Ruakākā property***

- 6.14 The property where the pipeline was damaged illustrates the challenges for these communication activities. Nobody has ever lived at the property and it did not have a habitable building on it. On learning of the change of ownership for the property in 2013, Vector Gas (now First Gas) sent a new-owner information pack to the address. It was returned. They identified an accountant in Warkworth as an alternative contact address and sent the information to that address. They used that address for all the mailouts until an information pack was returned to them in 2016. They were given the address of the landowner's new accountant and they then sent the information to that address. After the 2017 rupture, First Gas contacted that accountant's office and telephoned the landowner directly. The landowner asked them to address mail to the address of the property from then on.<sup>48</sup>
- 6.15 The landowner told us that he had previously owned a farm elsewhere that had the RAP running across it. When he bought the Ruakākā property, he was told about the easement on the title and understood that it meant he should not dig to any depth in that area. He knew that he could carry out normal surface cultivation. He knew about these constraints from his previous experience owning land with the RAP under it and from the easement on the title to the Ruakākā property. He said that he did not recall ever receiving any mailed information packs about the RAP for the Ruakākā property, either directly or through his accountant.
- 6.16 First Gas told us that they often have to use registered addresses, which are usually at the offices of lawyers or accountants, when mailing information to landowners. Many properties, especially in rural areas, are owned by businesses, trusts, or other organisations, and it is common for them to use a registered address. First Gas considered that the system of registered addresses generally works well, and it is reasonable for them to rely on it. They see difficulties in trying to implement a system to follow up on mail sent to such addresses to check it has been passed on or to try to establish personal contact with landowners in such cases. Cost was one factor, but not the only one.

### ***Independent assessments of these preventive measures***

- 6.17 Fueltrac assessed these preventive measures against the legal requirements and the 2012 Standard. They found that the protective activities were generally good. While acknowledging that the 2012 Standard provides for judgement to be exercised about how it is implemented, to take account of individual circumstances, they identified some areas that they thought warranted more attention. The specific points identified were:
- **The desirability of prioritising face-to-face visits where possible:** Section 7.3.2.2 of the 2012 Standard makes clear that the basic requirement is to visit landowners or occupiers to give them information about the pipeline. The option of mailing out information is given as a possibility where it is not possible to contact people personally. The length of the RAP and number of properties affected makes it challenging to expect regular personal contact with all owners or occupiers. Until 2015 there was no provision in the Refining NZ or First Gas contract for visits to landowners, unless they were asked to attend to, advise on, or oversee work. Since 2015, the contract has

<sup>48</sup> We are not sure why the landowner asked them to use this address, or why they accepted it, given that the land was still unoccupied. We understand from the landowner that he has barely returned there since the events of 2017.

required First Gas to visit new landowners within a month. Other communication has largely been by mail. Since the 2017 outage, Refining NZ and First Gas have changed the contract to include a new full-time role of a dedicated liaison person for the pipeline. They have told us that this person now visits new landowners and occupiers in person and is working towards visiting all landowners and occupiers each year. We have been advised that the experience in Australia is that the more personal the contact, the better the level of engagement with the need to protect a pipeline.

- **Communication with the community, and neighbours in particular:** Each part of section 7.3 of the 2012 Standard refers to the need to communicate with the community and/or general public, as well as stakeholders, about the pipeline, its dangers, and the limits on what can be done in the easement area. Section 4.8 specifically mentions neighbours. The contract between Refining NZ and First Gas requires systematic interaction with all the main stakeholder groups, including landowners and occupiers, but does not cover neighbours or the general public and community at large.<sup>49</sup> Refining NZ works to engage generally with the local community near the Marsden Point refinery (for example, through sponsorships, scholarships, and involvement in community events), but this is not the same as systematic communication with the people living and working close to the pipeline on the matters the Standard says they should be informed about.
- **Communication about the dangers of interference with the pipeline:** The samples of communication material provided to the Inquiry focus on the restrictions (what not to do), the help available, and contact information. All of this information is important, but the 2012 Standard also specifies that people should be informed about the hazards and dangers of interference (see sections 7.3.2.2 and 7.3.2.3.) The samples provided do not contain any significant information of this kind. This information is an important reinforcement, because it makes clear that the restrictions are not just to protect the pipeline but also to protect people, property, and the environment.

6.18 The May 2019 report from GPA Engineering also identified these first two issues as areas in which there was scope to strengthen the current arrangements. Refining NZ has indicated it is considering implementing the suggestions on all three issues.

## Measures to detect damage

### *Inspection and detection mechanisms*

- 6.19 The second group of protections aims to detect risks and possible damage. The two main ways are through in-line inspections of the pipe itself, using pigs and visual surveillance inspections carried out by people travelling the length of the RAP by aeroplane, vehicle, and on foot. These checks are periodic and each looks at a different aspect. Between them, they increase the chances of detecting risks or damage but they cannot provide complete certainty.
- 6.20 The various in-line inspections have already been discussed in chapter 5.
- 6.21 First Gas carries out a regular programme of surveillance inspections along the length of the RAP to look for risks or damage that might affect either the gas or the petroleum pipeline, as follows:
- **Vehicle patrols along roads:** In the Auckland urban area, where about 30 kilometres of the RAP follows roads and road reserves, they carry out daily vehicle patrols. Vehicle patrols around the Ruakākā area were required every three months under the 2012 contract. We were told that in practice, they are carried out fortnightly. These patrols aim to inspect areas where the pipe runs

<sup>49</sup> However, safety information is sent to neighbours of the pipeline once every five years in urban areas.

along or crosses a road. They are not designed to monitor activity on rural land, although they might pick up obvious unauthorised activity.

- **Aerial inspections:** There are monthly aerial inspections of the RAP in both urban Auckland non-road patrol areas and all rural areas. Before the 2017 incident, these inspections were usually done in a fixed-wing aeroplane flying at a height of 500–750 feet. Three times a year the inspection would be done in a helicopter. Helicopter inspections are more expensive, but they can fly lower, more slowly, and can pause and hover. The system was changed after the incident and all aerial inspections are now done by helicopter. The aerial inspections aim to identify current activity of interest, land movement, and obvious changes to the surface of the land.
- **Foot patrols:** Before 2018, First Gas carried out occasional foot patrols in areas where there had been a problem. Since May 2018, Refining NZ requires foot patrols to be carried out annually along the easement in rural areas.
- **Geohazard patrols:** Every year a geologist flies over the pipeline by helicopter to look for geohazards. Refining NZ also engages a consultant to walk the easement every five years for this purpose.

**Inspection of this part of the RAP in 2014**

6.22 Table 5 sets out the sequence of the different surveillance inspections in the second half of 2014, along with the times at which we know diggers were operating on the property. None of the aerial or vehicle inspections identified a problem at the property.

**Table 5: Inspections of the Ruakākā section of the RAP in late 2014**

Date	Inspection activity
July	In-line inspection by Refining NZ confirms no structural damage of the RAP
8 August	Vehicle inspection
18 August	Aerial inspection
26–28 August	Digger digs over the pipeline and damages the pipe; large hole partly filled in
A few days later	Landowner fills in holes a little more, using small digger
12 September	Vehicle inspection
30 September	Aerial inspection
13 October	Aerial inspection
Late October	Digger returns to the property to fill in the holes and reinstate the land
11 November	Aerial and vehicle inspections

6.23 We asked First Gas to explain why the disturbance to the land was not identified by the surveillance activity in September, October, or November 2014. They told us that the fixed-wing flights used then could only detect what they described as “gross disturbance” of the land. They explained that the people doing the flights looked for things like significant planting, creation of new tracks, new soil, house construction, slips, subdivision activity, and trenching. Something that simply looked like bare earth could have been disturbed by ordinary cultivation, cropping, stock damage, spraying, or similar. All of these are permitted activities, so they would not note them down or report disturbance of this kind. They added that it would be very hard to detect unauthorised digging that was covered up again, unless it was occurring during an inspection.

- 6.24 The Inquiry discussed with Refining NZ and First Gas some photographs that had been taken of the property on 26 October 2014 and 9 November 2014, which showed a large patch of bare earth in the easement area. First Gas confirmed that an aerial inspection at that time would have been unlikely to note and report that kind of soil disturbance, because it could easily have been caused by permitted activities.



**Figure 4: Aerial photographs showing the soil disturbance, October/November 2014**

- 6.25 We understand that it is not possible to see what is happening on the land in detail when looking from a fixed-wing plane: Visibility is not always good and cloud cover can be a problem. We commend Refining NZ and First Gas for now using helicopters for all their monthly aerial surveillance flights.
- 6.26 We questioned whether there were other changes that could be made to improve the chances of detecting unauthorised activity in the easement area. We were concerned that the systems were unlikely to assess whether a large patch of bare earth directly over the pipeline was caused by shallow cultivation or deeper disturbance, such as digging with machinery.
- 6.27 The Inquiry was told that the procedure has been for those carrying out the surveillance simply to note down and include matters in reports if they were clearly unauthorised or obviously likely to be a concern. They would then follow up on what was usually a small list of items to check. Refining NZ told us that since the 2017 outage, more attention has been given to potential issues. We suggested that First Gas and Refining NZ should consider reversing their approach, so that all material soil disturbance in the easement area is recorded and followed up on, to check whether it is problematic. This approach would take more resources but could increase the chances of detecting unauthorised activity and possible damage. Refining NZ and First Gas have indicated they are willing to do this.
- 6.28 Refining NZ submitted to the Inquiry that, even if the damage in this case had been detected earlier, they would have been required to shut down the pipe immediately once they saw the extent of the damage. They calculated that the time to repair the pipeline, and therefore the outage period, would have been similar. The main difference would have been that there would not have been an uncontrolled leak of fuel. We did not attempt to verify this advice.
- 6.29 This more intensive level of follow up would not necessarily be appropriate for all the pipelines that First Gas monitors across the country. However, some pipelines are more important than others. We consider the RAP to be a particularly critical part of national infrastructure, given its role in supplying fuel to Auckland and jet fuel to Auckland Airport.

6.30 In our view, although the surveillance activity meets the current legal requirements and the 2012 Standard, Refining NZ needs to work with its contractor to explore how to make the surveillance activity more effective.

### **Our findings on how well the RAP was protected**

6.31 We find that Refining NZ operates and maintains the RAP in accordance with the legal requirements and standard industry practice.

6.32 We acknowledge that the 2012 Standard allows for judgement on what is appropriate for the specific circumstances. Nonetheless, we find that there are areas where there is scope for further improvement. We discuss these in the next chapter.

#### **Summary of our findings**

- Refining NZ maintained and operated the RAP properly and in keeping with all legal requirements and standard industry practice.
- The arrangements to prevent and detect risk or damage to the RAP are substantial and accord with the legal requirements and standard industry practice.
- The landowner of the Ruakākā property knew about the RAP when he bought the property because the easement was recorded on the title.
- Ongoing communication with landowners and occupiers is through mailouts of information. Refining NZ's contractor (First Gas) does not currently confirm whether mail sent to registered addresses has reached the landowner but it is investigating ways to do so.
- The landowner of the Ruakākā property did not recall receiving any information about the RAP through the mail over the years that he owned the property.
- First Gas, on behalf of Refining NZ, now visits new landowners or occupiers in person within a month. In addition, they are working towards annual visits to landowners and occupiers.
- In the past, none of the surveillance activities would be likely to identify this kind of soil disturbance as a potential problem and report it for follow up action.
- Refining NZ and First Gas are continuing to make changes to the surveillance activities, to improve the chances of identifying unauthorised activity and preventing damage.

## 7 The lesson from how the RAP was damaged: protecting the RAP is important, and challenging

### Why it matters

- 7.1 The whole fuel supply chain to Auckland is critical infrastructure for New Zealand. In reports on New Zealand infrastructure, it is recognised as nationally significant. The New Zealand Lifelines Council identified all its components, from the Marsden Point wharf through to the jet fuel link at Auckland Airport, as “pinch-points”: single sites that would cause a significant loss of national service if they failed.<sup>50</sup>
- 7.2 That report includes Auckland Airport as a pinch-point as well, because it is the gateway for 75% of international visitors. In 2015, the Government’s *Thirty Year New Zealand Infrastructure Plan* noted that the airport’s operations contributed \$3.5 billion to regional GDP and provided 33,100 jobs. Its long-term plans for investing in more infrastructure were expected to increase regional GDP by a further \$2 billion.<sup>51</sup>
- 7.3 We have no doubt that all of the companies that own, operate, and use this fuel supply chain take their responsibility to protect this infrastructure seriously.
- 7.4 The RAP was our focus because that is what was damaged in 2017 and because protecting it is complex. It is a long pipeline, compared with many, and it crosses rural and urban areas of varying topography. Many people live and work near it and the character of the areas it crosses is changing, with the increasing urbanisation of the rural areas on the outskirts of Auckland.
- 7.5 We acknowledge that the RAP can never be protected perfectly. There is a balance to be struck that has to consider the level of intrusion into the rights of those who own the land it runs through and the cost-effectiveness of the protective systems.
- 7.6 Identifying risks, and doing what is possible to prevent them from materialising, is the first step towards building resilience. In this chapter, we discuss what is being done and what more we think should be done to advance this aspect of the resilience of Auckland’s fuel supply system.

### The current protections

- 7.7 There is a strong network of interlocking protections in place, maintained by Refining NZ and First Gas, who are active participants in the international network of pipeline operators. In several places, the protection they maintain for the RAP (and the gas pipeline in the same trench) exceeds standard industry practice.
- 7.8 We are satisfied that all the technical checks and inspections are carried out well. Our main area of focus was the systems for protecting the pipeline from external interference and to detect possible risks or damage to it.

### Education and communication

- 7.9 We regard the overall systems for communicating with people, educating them about the restrictions, and supporting people who do need to work near the pipeline, as strong. They reinforce one another, so that if one system fails, another is there to fill the gap. This was demonstrated by the example of

<sup>50</sup> New Zealand Lifelines Council, *New Zealand Lifelines Infrastructure Vulnerability Assessment: Stage 1*, September 2017, p 5.

<sup>51</sup> New Zealand Government, *The Thirty Year New Zealand Infrastructure Plan 2015*, p 25.

## 7 The lesson from how the RAP was damaged

the Ruakākā property, where the landowner did not recall receiving any mailed information packs but knew about the RAP and the restrictions because of the easement on the title.

- 7.10 The survey work that First Gas has carried out recently has shown that this work is effective, with high levels of awareness. However, as this incident showed, there are always some people who do not know or care about restrictions of this kind. The challenge is to identify what more can be done, as there is always scope for marginal gains in effectiveness of these efforts.
- 7.11 We note that since 2017, Refining NZ and First Gas have established a new role of a full-time liaison person for the RAP. This person is responsible for liaising with landowners and occupiers as needed. We have been told that this person now visits new landowners and occupiers within the first month, and is working towards making annual visits to all landowners and occupiers along the RAP.
- 7.12 This is a good development. We have been told that the experience of pipeline operators in Australia is that:

*Landowner/occupier liaison is often regarded as [a] very effective procedural control in rural areas where rural landowners/occupiers and pipeline land liaison or operations personnel have established personal contact and good relationships. In these cases, the rural landowners/occupiers are more likely to directly telephone pipeline land liaison or operations personnel, because of the good relationships.<sup>52</sup>*

- 7.13 In addition, we note that the 2012 Standard specifically mentions liaison with neighbours and the community as important potential contributors to the protection of pipelines. We think that Refining NZ and First Gas should work to find ways to include close neighbours in their communication activities, given that they might be closer to the RAP than the landowners, see problematic activity, or be within the identified risk zone at the time of an incident. Similarly, we think they should continue to explore ways to build links with the communities along the length of the RAP.
- 7.14 Experience in other industries, such as electricity lines, supports the view that a well-informed local community can be a strong ally in preventing and detecting risks. This point was illustrated recently. Just as we were completing this report, Refining NZ told us about an incident of unauthorised digging works over the pipeline on 1 August 2019. A neighbouring landowner raised the alarm, enabling Refining NZ to intervene and prevent any damage.

### **Inspections and surveillance**

- 7.15 We found that the in-line inspections of the RAP are carried out based on data from the last inspection and the level of risk. This is in keeping with industry standards, and inspections in the past have shown that the RAP has been well maintained and is in good condition. These technical inspections are primarily designed to detect gradual deterioration and damage, such as corrosion. Given the time between them, they are not likely to be useful for detecting sudden events that cause damage.
- 7.16 The visual surveillance and inspection activities are more frequent than the in-line inspections. They are also carried out in accordance with current industry standards. The inspections by vehicle are mainly concerned with points where the RAP crosses roads – they do not go down lanes or driveways to get close to the RAP itself in rural areas. The aerial inspections take place once a month and, in the past, have looked for “gross disturbance” or obvious risks such as construction activity or recent slips. The foot patrol takes place only once a year in rural areas.
- 7.17 We acknowledge that the various protection mechanisms interact, so that if one is likely to be weak, the focus should be on strengthening other parts of the system to compensate. Here, the fact that the

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<sup>52</sup> GPA Engineering, *Report into Refining NZ's Management of the RAP*, May 2019, p 14.

## 7 The lesson from how the RAP was damaged

inspection and surveillance systems have limited effectiveness means that the preventive mechanisms become even more important.

- 7.18 We are pleased that Refining NZ and First Gas have made some changes since 2017 to strengthen their surveillance work. For example, they now always use helicopters for aerial inspections, which can fly at lower altitudes and more slowly. They have also introduced an annual foot patrol.
- 7.19 We accept what First Gas told us, namely that their surveillance systems at the time would have been unlikely to detect or raise an alarm about the soil disturbance that occurred on the Ruakākā property, unless they happened to be inspecting on the day that the digger was working over the RAP. However, we do not think that is satisfactory.
- 7.20 From the photographs that were taken in October and November 2014 (see Figure 4), the area of disturbed soil was large and directly over the RAP. From the facts we have established, set out in chapter 4, this area was only partially filled in between August and the end of October. We have no photographs showing what the surface looked like during this period, but the disturbance may have been significant. During that period, there were two aerial inspections and one vehicle patrol, none of which reported a concern.
- 7.21 We acknowledge that there will always be a balance to be struck in relation to cost-effectiveness. However, we encourage Refining NZ and First Gas to continue to explore how to make the aerial surveillance more useful and to interrogate the information they collect with more vigilance.
- 7.22 In our view, Refining NZ and First Gas should consider reversing their current assumption about what matters need to be noted and followed up. In the past, they have assumed that most soil disturbance has been caused by allowed activities, like cultivation, and only reported and followed up on obvious issues. We suggest that they change that threshold and note all soil disturbance of any significant size over the RAP. They should then follow up with the records of permits issued, and with landowners as needed, to assess whether the activity was allowed or created a risk. Refining NZ and First Gas have told us that they are willing to make this change. They noted that they already give more attention to potential issues, given what they have learned from the 2017 outage.

### ***Exploring new technology***

- 7.23 Refining NZ and First Gas are also exploring surveillance options using technology, such as mapping technology that uses laser to create 3D images (LiDAR). This work is ongoing as they evaluate the technology's effectiveness and efficient use.
- 7.24 Drone surveillance is another obvious possibility that they have been considering. However, limitations around flight paths, safety, property rights, and privacy mean that at this stage, it does not provide a good solution.
- 7.25 We are pleased that Refining NZ is exploring these types of options and encourage them to keep going. Advances in technology may well provide some useful tools in future.

### **Creating better legal protection of the RAP**

- 7.26 The Inquiry heard strong views from both Refining NZ and First Gas that nationally critical infrastructure like the RAP needs better protection through the law. They raised several possibilities:
- expanding the designations under the RMA;
  - using national directions under the RMA to ensure that protection of the RAP is embedded in local authority planning and consenting systems;
  - creating a legal duty to report damage to infrastructure of this kind; and

## 7 The lesson from how the RAP was damaged

- creating a criminal offence of wilfully or recklessly damaging critical infrastructure.

7.27 They told us that they hoped such changes would mean that other agencies could support them more when it came to applying and enforcing the restrictions on activity in the easement area. We heard that at present, both could be difficult, and rely on the goodwill of property owners.

### ***Expanding the designation under the RMA***

- 7.28 Refining NZ is investigating whether to seek to change the designation that protects the RAP. At the moment, in rural areas the designation restricts activity in an area 12 metres wide (6 metres on each side of the pipeline). In their view, this distance is not large enough to protect the RAP from possible damage by machinery that is routinely used, such as tools used for laying pipes or cables.
- 7.29 They are considering whether to begin the statutory process to change to a designation that is 50 metres wide (25 metres on each side of the pipeline), to counter these risks. Such a designation would not create uniform restrictions across its full width. Rather, they would be graduated to increase the protection towards the centre where the RAP is buried.
- 7.30 The Inquiry did not form a view on whether this would be a suitable step to take from a technical or legal perspective. However, we note that this would be a major project and would take some years. We regard the fact that Refining NZ is actively considering expanding the designation as evidence that Refining NZ continues to think broadly about how it might better protect its infrastructure.

### ***A national direction under the RMA to protect the RAP***

- 7.31 With regard to the restrictions on activity in the area currently covered by the designation and easement, Refining NZ and First Gas both gave the Inquiry examples in which local authority staff had overlooked the designation and issued consents for construction directly over the RAP. They have therefore considered whether there are other legal instruments that might better embed the protections into local authority decision-making systems.
- 7.32 Their view is that it would be appropriate to create national directions under the RMA to protect the RAP, such as those that protect Transpower's national grid. This would be a much stronger way of embedding the issue into local authority procedures so that it is not overlooked so easily. The national grid is protected by a National Policy Statement and a National Environmental Standard.<sup>53</sup> The Ministry for the Environment maintains a list of the Government's priorities for work on national directions.
- 7.33 The Inquiry agrees that putting in place national directions could be a useful step. We recommend that the Ministry for the Environment should work with MBIE and the Treasury, in consultation with Refining NZ and First Gas, to assess the type of national direction that might be most suitable for creating better protection of the RAP and similar networked infrastructure.

### ***Creating an effective enforcement regime***

- 7.34 In relation to enforcement, the Inquiry heard that it was hard to get immediate or effective support when Refining NZ or First Gas had found someone excavating or building over the RAP and they refused to stop the work. They regarded the existing local authority systems for enforcing the restrictions in the designation as too weak and too slow; it could take several days or longer to get meaningful action. They told us that WorkSafe New Zealand was not always able to respond and the police were generally reluctant to become involved in what they regarded as essentially a civil matter, rather than a criminal one.

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<sup>53</sup> See the National Policy Statement on Electricity Transmission, March 2008, and the Resource Management (National Environmental Standards for Electricity Transmission Activities) Regulations 2009.

## 7 The lesson from how the RAP was damaged

- 7.35 Refining NZ and First Gas thought that a specific criminal offence would both raise the profile of the issue and mean that the police would be more willing to provide immediate help. They also advocated for a clear legal duty to report damage.
- 7.36 We agree that this incident has highlighted that the enforcement systems and sanctions are weak, if someone ignores the restrictions on activity over the RAP. Although this issue has been identified because of the RAP outage, it is a general issue that could affect critical infrastructure across the country.
- 7.37 MBIE drew our attention to the Submarine Cables and Pipeline Protection Act 1996, which creates several different offences relating to damage to, or dangerous behaviour near, submarine cables and pipelines.<sup>54</sup> These provisions are a useful precedent from New Zealand law.
- 7.38 First Gas provided us with information on legislation enacted in 2009 in New South Wales after unauthorised digging and drilling work caused two major power outages in Sydney.<sup>55</sup> As a result, the Gas Supply Act 1996 (NSW) now provides that:
- a person must contact the “dial before you dig” information line before almost any excavation work on protected land and give notice of proposed work to the network operator if that is required;
  - if a person becomes aware that they, or someone they have authorised to carry out work, has caused damage to the infrastructure, they must report the damage to the network operator;
  - an inspector appointed by the network operator has powers to enter private land and to issue stop work notices;
  - the network operator can apply for an injunction to prevent dangerous work;
  - the network operator can recover costs for work carried out in breach of a stop work notice; and
  - it is a criminal offence to interfere with the network, to fail to contact the “dial before you dig” information line, and to fail to report damage.
- 7.39 The penalties are potentially significant for companies and individuals, including up to five years’ imprisonment, compensation for the network operator for damage to the network, and costs incurred in preventing or mitigating damage.
- 7.40 The protective regime in this Act is more developed and directly applicable than that in the Submarine Cables and Pipeline Protection Act. We think the New South Wales legislation creates a regime of protection and enforcement measures that could be usefully adapted to New Zealand’s infrastructure networks.
- 7.41 In our view, the Government should consider legislation to create an equivalent statutory regime to protect critical infrastructure in New Zealand. Because the issue extends beyond the energy sector to infrastructure more generally, we recommend that the policy work to develop it should be carried out by MBIE and the Treasury, given the Treasury’s responsibility for policy on infrastructure issues.
- 7.42 In the meantime, we recommend that Refining NZ and First Gas should work with the police in the relevant regions and with relevant local authorities to put in place protocols governing how these agencies respond to situations in which urgent action is needed. These protocols should aim to create better knowledge within these organisations about the RAP, why it is important, and why swift action is sometimes needed. Local authorities have powers to enforce the restrictions in the designations under

<sup>54</sup> See, in particular, section 11, which makes it an offence to wilfully or negligently cause damage to a cable or pipeline, and section 13, which makes it an offence to fish or anchor in a protected area.

<sup>55</sup> The Energy Legislation Amendment (Infrastructure Protection) Act 2009 (NSW) inserted provisions into the Electricity Supply Act 1995, Gas Supply Act 1996, and Criminal Procedures Act 1986.

## 7 The lesson from how the RAP was damaged

the RMA and they can call on the police to support them when needed. The protocols would aim to speed up and streamline the response from these agencies, using those existing powers.

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### Our recommendations

The following recommendations are designed to better protect the RAP. They would contribute to resilience by strengthening the mechanisms for preventing damage to Auckland's fuel supply. We recommend:

#### **Recommendation 1: Update the law on operating standards**

That MBIE updates the Health and Safety in Employment (Pipeline) Regulations 1999 so that the legal requirements match the current industry standards on pipeline operations.

#### **Recommendation 2: Improve communication with landowners**

That Refining NZ continues to work to find cost-effective ways to establish and maintain direct personal contact with landowners or occupiers, such as by developing the role of the RAP liaison officer or by strategic use of email, messaging services, and social media.

#### **Recommendation 3: Improve communication with neighbours and the community**

That Refining NZ works to find cost-effective ways to:

- include neighbours who live close to the pipeline in their communication activities; and
- interact with the general public in the communities living along the RAP, informing them about the dangers, the restrictions, and what to do if they have concerns.

#### **Recommendation 4: Improve the surveillance activity**

That Refining NZ continues to work to find cost-effective ways to:

- increase the effectiveness of its surveillance activity, especially aerial surveillance – for example, by changing it to note all material soil disturbance over the RAP and follow up with the records of permits issued (and landowners, as needed) to assess the level of risk; and
- use technological advances to introduce new surveillance systems as they become available and practical.

#### **Recommendation 5: Expand the protection of the RAP under the RMA**

That the Ministry for the Environment works with MBIE and the Treasury, in consultation with Refining NZ and First Gas, to assess the type of national direction under the RMA that might be most suitable for creating better protection of the RAP and similar networked infrastructure.

#### **Recommendation 6: Create offences for damage to infrastructure**

That the Government directs MBIE and the Treasury to develop proposals for legislation to create a statutory regime to protect networks and other critical infrastructure in New Zealand, based on the Gas Supply Act 1996 (NSW) and the offences in the Submarine Cables and Pipeline Protection Act 1996.

#### **Recommendation 7: Put in place protocols with enforcement agencies**

That Refining NZ, First Gas, WorkSafe New Zealand, relevant local authorities, and regional police work together to put in place protocols with these agencies on how they respond in situations in which urgent action is needed.

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## Part C: The 2017 outage

### 8 National and fuel sector systems for responding to crises

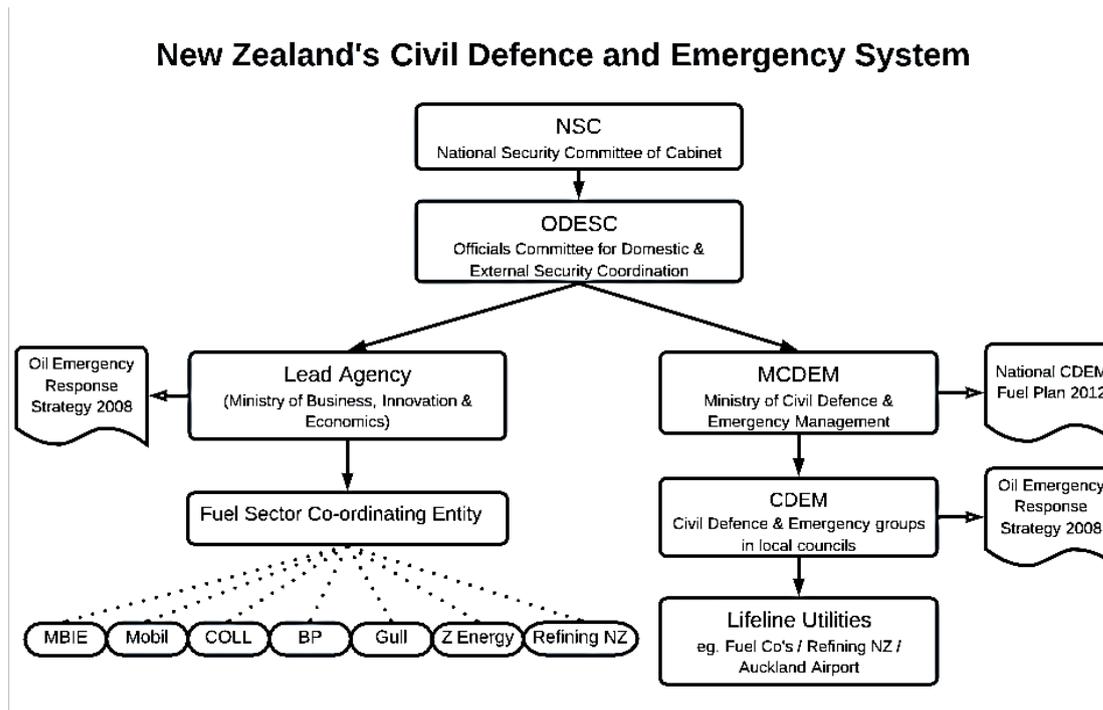
- 8.1 Being well prepared and responding effectively are important components of a resilient system. In this Part, we consider the operational responses to the 2017 outage, its impacts, and the risk management practices of all those involved in it, including the emergency management organisations.
- This chapter describes the emergency response systems and preparations that existed in 2017 when the outage occurred, because they provide the backdrop for understanding what happened.
  - Chapter 9 explains what happened on the day of the outage (Thursday 14 September 2017) and how Refining NZ worked to find the leak, fix the pipeline, and restore supply.
  - Chapter 10 sets out the communication and coordination activities during the outage.
  - Chapter 11 examines the steps that were taken to manage the effects of the outage, including setting up alternative methods of supply and rationing jet fuel.
  - In chapter 12, we set out the lessons that we have identified from how the 2017 outage was managed and our recommendations on these matters.

#### **New Zealand's system of civil defence and emergency management**

- 8.2 If an incident is larger than individual organisations can manage, New Zealand has a developed public sector system for responding to incidents and emergencies: the civil defence and emergency management system (CDEM system). It is triggered by the Government declaring a national emergency or a local civil defence group declaring a local emergency.
- 8.3 New Zealand's CDEM system aligns with international practice by being built around "the four R's": reduction of risk, readiness for an event, response, and recovery. These four concepts permeate all layers of the system. Figure 5 provides an overview of the system.

#### ***National organisations and roles***

- 8.4 The **Ministry of Civil Defence and Emergency Management (MCDEM)** is headed by the Director of Civil Defence and Emergency Management and has responsibility for the overall system and for managing national events. It administers the Civil Defence and Emergency Management Act 2002 (CDEM Act), which provides the legal framework for managing civil defence events and emergencies. The Director's functions are both preparatory (identify nationally significant hazards and risks, maintain the national CDEM strategy and plan, and develop guidelines and codes to support work under the Act) and responsive (direct and control resources during a state of national emergency).
- 8.5 The MCDEM is supported by the **Officials Committee for Domestic and External Security Coordination (ODESC)** system, which is the system for oversight and governance of all national security issues, including significant crises or events that might need all-of-government planning and prioritisation. The aim is for agencies to work collectively to bring together information and coordinate analysis and advice for Cabinet.



**Figure 5: New Zealand's CDEM system**

8.6 The CDEM system has three levels:

- **National Security Committee of Cabinet (NSC):** this is chaired by the Prime Minister and is where the Government makes decisions on national responses to major crises.
- **Officials Committee for Domestic and External Security Coordination (ODESC):** this is chaired by the Department of the Prime Minister and Cabinet (DPMC), which coordinates all-of-government responses to events and provides policy oversight and advice to the Prime Minister, Cabinet, and the NSC.
- **Watch groups** and working groups of senior officials, who monitor individual sectors and topics.

8.7 The **lead agency** for any emergency or crisis is the one with the primary mandate for managing the response. The lead agency is expected to monitor and assess, plan and coordinate, report to ODESC, provide advice, and coordinate public information. It does this using its own emergency management plan, functions, and powers. It should maintain its own capability and capacity to be able to perform this role when needed, although support from emergency management experts is available from MCDEM.

8.8 The **National Crisis Management Centre (NCMC)**, run by MCDEM, is the central government facility for enabling national coordination and management of the response to emergencies. It is kept in a constant state of readiness and can be activated without a local or national emergency being declared.

#### **Local and sectoral groups and roles**

8.9 The CDEM Act requires every **local authority** to establish and maintain a **CDEM Group**: these are the core of the preparation and response machinery under the Act for a geographical area. Each CDEM Group must:

- identify hazards and risks and take steps to reduce them;

- ensure it has an organisational structure and competent and trained people ready to respond;
  - respond and manage emergencies and recovery activities in its area;
  - monitor and report on compliance with the Act in its area;
  - develop, implement, and monitor a CDEM Group plan and review it regularly; and
  - participate in the national strategy and plan work.
- 8.10 **Clusters:** A cluster is a group of agencies that work to coordinate CDEM-related activity, including planning, inter-agency communications, and access to shared resources. The cluster is a flexible concept that is meant to be flexible and self-organising, operating at national, regional, or local levels, and within or across sectors. One of the specified clusters is “lifeline utilities”.
- 8.11 **Lifeline utilities** are listed in the CDEM Act. They are organisations that provide essential and enabling infrastructure and services. Organisations involved in the production, supply, and distribution of petroleum providers are included in the list. Each lifeline utility has a duty to ensure that it can function as fully as possible during and after an emergency.
- 8.12 **Sector Coordinating Entities (SCEs)** are the main mechanism for coordination and communication between the NCMC and entities within a sector. They are meant to provide for pre-planned sector coordination through a single point of contact for each lifeline sector. They can also be part of a cluster. Their readiness activities are generally limited to establishing emergency communication protocols within the sector for all agencies with a response role. Some SCEs do more and facilitate sectoral emergency exercises and contingency planning. The arrangements differ across sectors.

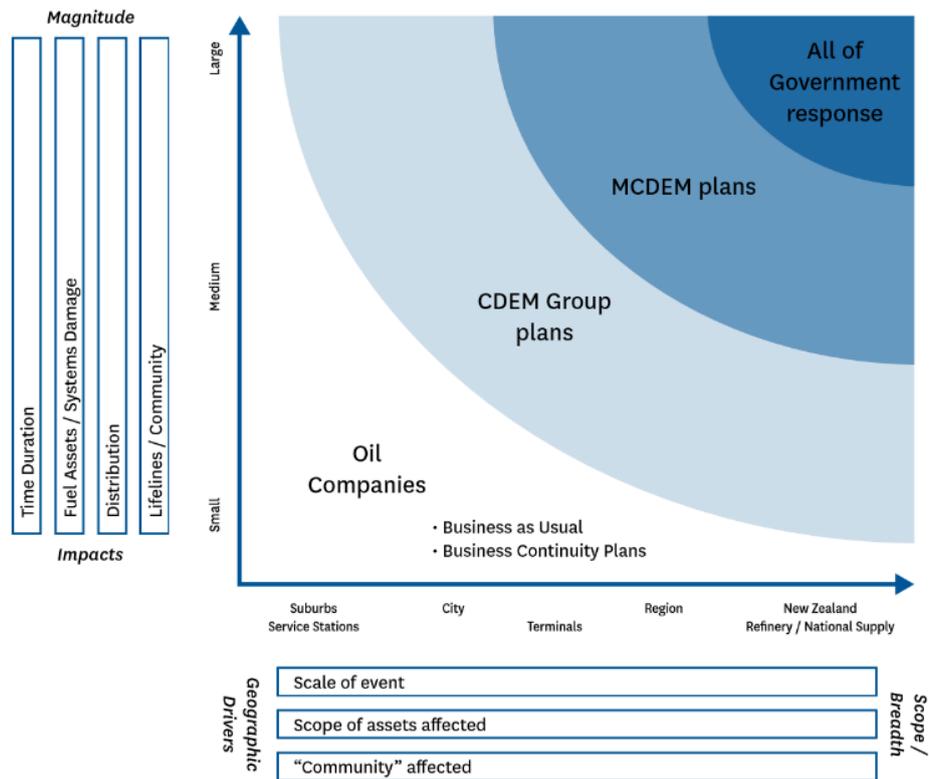
### Petroleum sector arrangements in 2017

#### *Public sector planning*

- 8.13 Within this overall system, the petroleum sector organisations make up a sector and are each lifeline utilities. MBIE is the lead government agency for the sector. Two documents describe the arrangements for a disruption to fuel supply: the Oil Emergency Response Strategy 2008 (the 2008 Response Strategy, published by MBIE) and the National CDEM Fuel Plan 2012 (the 2012 Fuel Plan, produced by MCDEM).
- 8.14 The 2008 Response Strategy is designed to address short-term fuel disruptions, coordinating as needed with the ODESC system and the business continuity plans of the individual companies. It makes clear that the fuel companies are initially responsible for responding to any disruption; it is only if an industry response is unlikely to be sufficient that the Government would become involved. It states:<sup>56</sup>
- In general, oil companies will have the initial role responding to an oil supply disruption. However, if the severity of the situation warranted it, the government could assist industry and intervene using the legislative and non-legislative measures contained in the Strategy and/or civil defence powers.*
- 8.15 Under the Strategy, MBIE’s key function is to convene and lead the National Emergency Sharing Organisation (NESO) required under the International Energy Agreement. MBIE is to collect information from the industry through NESO and use that information to provide advice to government, including advice on whether government involvement in a disruption is required.
- 8.16 The framework for assessing where responsibility sits is shown in Figure 6.

<sup>56</sup> Ministry of Economic Development, *Oil Emergency Response Strategy*, July 2008, p 7.

## 8 NZ systems for responding to crises



**Figure 6: Response arrangements for the oil sector<sup>57</sup>**

- 8.17 These layers of responsibility are repeated in the 2012 Fuel Plan, which also contains more operational detail. It sets out the “readiness planning framework” for the sector and national-level communication and coordination arrangements for response operations. It is designed for an emergency or event that is likely to have a major effect on national or regional fuel infrastructure or distribution. It focuses mainly on ground fuels.
- 8.18 The 2012 Fuel Plan sets out the details for an agreed coordination process, centred on a teleconference. This teleconference forms the national Fuel Sector Coordinating Entity (Fuel SCE, which is effectively the same as the NESO). It is activated and chaired by either MBIE or the NCMC (depending on the level of the crisis). The participants in the Fuel SCE are listed as COLL, Refining NZ, Mobil, Z Energy, Chevron (bought by Z Energy in 2016), BP, Gull, and the relevant government agency.
- 8.19 For the Inquiry’s purposes, the other relevant part of the 2012 Fuel Plan is the information-reporting system that it sets up. The various companies are required to provide:
- the status of their facilities and transport networks;
  - confirmation of fuel stocks by type and location;
  - estimates of future changes to stocks;
  - estimates of emergency demand levels;
  - their capability to supply critical customers; and
  - their overall ability to manage demand.
- 8.20 In addition, there is the Auckland Region Fuel Contingency Plan 2016, prepared by Auckland Council. Like the 2012 Fuel Plan, it is primarily concerned with ground fuels and arrangements for prioritising

<sup>57</sup> Source: MCDEM, *National Civil Defence Emergency Management Fuel Plan*, 2012, p 10.

allocations of fuel to lifeline utilities and critical customers in a full emergency. The 2017 outage did not reach this level of seriousness and no prioritisation was activated under the Auckland or National CDEM Fuel Plan.

### ***The individual companies***

- 8.21 The individual companies and organisations in the fuel sector sent us their individual emergency response and business continuity plans. These were all comprehensive and up to date. We were told that each organisation carries out its own regular practice exercises. This level of focus on being able to respond to crises is not surprising in a high-hazard industry like the petroleum sector.

### ***Sector-wide preparation and practice***

- 8.22 MBIE told the Inquiry that the coordinating body, the Fuel SCE, meets by teleconference as needed when there is an emergency or elevated risk of supply disruption. It also meets in person for planning purposes. We were told that it is a small group and the standing teleconference system works well as a way of bringing people together. MBIE advised that the Fuel SCE last met for a workshop in November 2018 to discuss risk reduction and planning for regional fuel disruption scenarios.
- 8.23 The only recent exercise relevant to the fuel sector was Exercise Tangaroa, in 2016. This was a national CDEM sector exercise based on a scenario of an earthquake and tsunami. The scenario had a fuel sector element by incorporating significant damage to the fuel supply infrastructure, including the Marsden Point refinery, fuel tank farms located at ports, and wharves. The exercise showed that in this situation, it would be difficult to obtain refined fuel stocks and bring them to New Zealand before the stocks already in the country were depleted. It also found that damage to pipelines would leave Auckland isolated for fuel supply, especially for jet fuel. The Fuel SCE met after this exercise to discuss its implications.
- 8.24 There have been no group exercises for the organisations in the sector as a whole to practise preparedness and responses together and test the sector-wide plans.

## 9 What happened in September 2017<sup>58</sup>

### Thursday 14 September 2017: the day of the outage

- 9.1 On Thursday morning, the RAP was moving a batch of jet fuel towards Auckland. The pumping system “tripped” and automatically shut down at 9.54am when someone working on the system caused a false fire alarm. Trips of this kind are reasonably common, for a variety of reasons. The control room team began the standard restarting process at 10.15am.
- 9.2 By 11.56am, the flow in the pipeline had reached about 60% capacity. At that moment, there was a sudden drop in pressure, which caused the pipeline to shut down automatically again. The control room operators followed established protocols and carried out a set of checks and tests before trying to restart it using standard procedures, but these attempts failed.
- 9.3 The monitors showed that a RAP valve at Waipū Cove, about 20 kilometres from the refinery, had closed as part of the safeguarding system and was preventing a restart. Further checks showed that the pressure was low at Marsden Point, for no clear reason. The control room asked a technician to go and inspect the valve at Waipū Cove. At 1.23pm, the technician confirmed that the pipeline pressure between Marsden Point and Waipū Cove was zero.
- 9.4 At 1.40pm, the control room notified the Pipeline Controller that there was a problem. At 1.45pm, Refining NZ initiated formal steps to prepare for a possible leak. At the time, the Pipeline Controller and colleagues were on a helicopter surveillance flight of the RAP in the Auckland area. They took a helicopter from Ardmore Airport to go north and fly over the section of the RAP where the problem was. At 2.40pm, they saw a pool of fuel forming in a paddock at Ruakākā, confirming there was a leak. The Pipeline Controller relayed the location to the refinery.



**Figure 7: Photograph of the leak site taken from the helicopter, 14 September 2014**

- 9.5 Refining NZ initiated its emergency response procedure. The senior management team was told about the leak and the company notified emergency services, First Gas, NRC, and WorkSafe New Zealand. Shortly after 3pm, they sent crews and equipment to the site. The initial priorities were to ensure the

<sup>58</sup> A full chronology of events across the period of the outage is set out in Appendix D.

## 9 What happened in September 2017

safety of the site and of the people in the area (including staff and neighbours), and then to contain the spill, remove leaked fuel, and remediate the site.

- 9.6 The site and surrounding areas were cordoned off, nearby residents were relocated, and access to the site was controlled. Work began to improve the access road and other infrastructure at the site so that heavy machinery and equipment could be brought on site. At the same time, they began to put in place barriers and booms to direct and contain the flow of fuel, and to remove spilt fuel using gully suckers, skimmers, and absorbent material.
- 9.7 Within four hours of the pipeline shutting down, Refining NZ had identified the location of the leak, secured the site, and started work to remove the fuel that had escaped. By late on Friday 15 September 2017, they had largely contained the spill.

### Fixing the damage to the pipeline

- 9.8 The next step was to begin to excavate, to expose the pipe and assess the damage. At that point, the refinery had no information on why the pipe had leaked. Excavation was difficult because the area has a high water table and the ground was sodden from winter rain. The standard procedures for excavating around pipelines require the work to be done slowly and carefully. The last 30 centimetres was dug out by hand.
- 9.9 It took until 6pm on Friday 15 September to expose the 2-metre-deep pipe and see the damage. That was when it became apparent that the damage was not a small, or “pinhole”, leak but that the pipe had suffered a major rupture. It had significant gouges and cracks in it, suggesting to those examining it that it had been struck by something some time earlier. That damage had weakened the pipe so that it had eventually cracked and ruptured.



**Figure 8: Photograph showing the damage to the pipeline**

- 9.10 If the pipe had had a pinhole leak, which is a more common problem in underground fuel pipelines, Refining NZ had been ready to fix it by applying a clamp. A repair of this kind could have been completed within one to two days. However, the damage to the pipe was much more substantial. By the end of Saturday 16 September, the repair team concluded that the best repair option would be to weld in a new section of pipe to replace the damaged section. Across the next seven days they:

## 9 What happened in September 2017

- finalised a repair plan and schedule, with input from a range of experts;
- excavated and removed water from the repair site, as well as at points on each side where the pipe would be blocked off while the repairs were carried out;
- replaced the damaged section with new pipe and welded it into place;
- developed a plan for restarting the pipeline;
- waited 24 hours, as required by safety standards, for the welds to be tested; and
- received certification from Lloyd's Register, the external certifier, approving operation of the RAP at a reduced pressure.

### Restoring supply

- 9.11 Restarting the RAP after an incident of this kind needed to be done carefully. Refining NZ was particularly concerned about the risk of an air bubble in the pipe. If air was sent down the RAP to Wiri, the pressure differential could damage the tank receiving the fuel.
- 9.12 They put water through the pipeline first, to displace any air, but this was not definitive. After consultation with industry experts, they slowly pressurised the line and opened the Waipū Cove valve to pressurise and fill the pipe with diesel from the refinery end. They used markers to monitor the progress of the contaminated fuel already in the pipeline and the clean fuel as it moved down the line to Wiri. They also sent two cleaning pigs down the pipeline to remove any rubble or smaller air bubbles that might be present.
- 9.13 The pipeline started pumping again on the afternoon of Sunday 24 September. The first fuel that arrived at Wiri was the three batches that had been in the pipeline when the rupture occurred:
- The first batch was jet fuel, which arrived at Wiri on Sunday 24 September, almost exactly 10 days after the outage occurred. It had been re-certified by Monday morning and was available for use at the JUHI that night.
  - The second batch was diesel, which was available for use at Wiri by the morning of Monday 25 September.
  - The third was another jet fuel batch, which arrived at the JUHI on Tuesday 26 September.
- 9.14 At the same time, the first new batch of jet fuel was being injected into the pipeline at Marsden Point. It was split into two smaller batches at Wiri, so that some could be sent through to the airport more quickly. The first partial batch arrived there on Thursday 28 September and the second on Saturday 30 September. A batch of ground fuel was sent down the pipeline next, followed by another batch of jet fuel.

### Fixing the environmental damage

- 9.15 The automated shutdown of the RAP limited the amount of fuel that escaped into the surrounding land and waterways at the leak site. Refining NZ estimates that 124 m<sup>3</sup> of fuel leaked in total. The refinery took prompt steps to contain the leaked fuel, including building weirs, drains, and walls to direct and contain it, and collecting and removing the fuel as well as contaminated water and soil. As a result, a relatively small area of land was affected and fuel did not escape further down the culvert or into the nearby river.
- 9.16 Over 115 m<sup>3</sup> of the leaked fuel was directly recovered. Most of the remaining 9 m<sup>3</sup> was removed with contaminated soil and groundwater and taken to Marsden Point for treatment.

## 9 What happened in September 2017

- 9.17 NRC monitored the work site and surrounding environment throughout the process, testing the soil, waterways, and groundwater for contamination. This monitoring confirmed that the environmental damage had been effectively contained.
- 9.18 Refining NZ continued to work closely with NRC, expert advisers, local hapu, and the landowners of the three affected properties for several months after the incident, to achieve the full remediation of the properties. NRC's files record that their incident file was eventually closed at the end of May 2018, when the contamination had been removed and drains reinstated. We note that the files record NRC's view that the work to contain the spill and remediate the land was done to the highest standard.

### **Our findings on the physical response effort**

- 9.19 We agree with NRC's view, and find that the way in which Refining NZ responded to the leak was swift, well coordinated, careful, thorough, and effective. The planning and preparation they had in place for incidents meant that the operation ran smoothly.
- 9.20 We also record that the refinery received good support and assistance from many others, so that they could draw on the best expertise available. We acknowledge the help provided by First Gas, who gave extensive help with the excavation and welding; BP and Mobil, who provided engineering advice; Worley Parsons; and Lloyd's Register.

#### **Summary of our findings**

- Refining NZ's response to the leak and its repair and remediation work was of a high standard.
- Others in the industry provided valuable expertise to support Refining NZ.

### 10 Communication and coordination during the outage

10.1 This chapter discusses how the communication efforts during the outage were managed. In any crisis, clear communication and effective coordination are an important part of the response effort. This was a challenge during the 10-day RAP outage.

#### The organisations involved

10.2 The outage affected all of the organisations involved in the supply of fuel by pipeline to Auckland:

- Refining NZ owns the RAP and was responsible for fixing the problem, and had to communicate with its fuel company customers.
- The three fuel companies had to manage their own customers' expectations and find alternative methods for supplying fuel to them.
- The infrastructure operators in the rest of the supply chain (WOSL, JUHI, and COLL) had to support their fuel company owners in finding solutions.
- The customers of the fuel companies – in particular, Air New Zealand and the other airlines that usually refuel at Auckland Airport – had to change their normal operations over this period.
- Other stakeholders, such as Auckland Airport and other airports around New Zealand and in nearby countries, became involved in the efforts to provide fuel for aircraft unable to refuel at Auckland.

10.3 Three of these companies are publicly listed (Refining NZ, Z Energy, and Auckland Airport), which means they also had obligations to disclose any significant information to the stock exchange.

10.4 There was obviously significant public interest as well, as the travelling public wanted to understand the effect on their ability to continue to drive or fly. Businesses and organisations that depend on fuel of one kind or another for their operations were also monitoring the situation closely.

10.5 As a result, central and local government agencies took a close interest. If the situation had become severe, they might have needed to activate emergency response measures. For Ministers, this was a time of heightened sensitivity, given that the general election was being held on 23 September 2017. The list of agencies involved was long. The central government organisations included:

- MBIE, which has policy oversight of the petroleum sector;
- MCDEM, which coordinates and supports the overall system in New Zealand for all crisis and emergency responses;
- DPMC, which has a coordinating role in any significant issue that might require an urgent government response;
- Ministry of Transport (MOT), which advises government on all forms of transport;
- New Zealand Transport Agency (NZTA), which administers the rules governing transport activities;
- WorkSafe New Zealand, which is responsible for the health and safety rules governing dangerous workplaces; and
- New Zealand Defence Force (NZDF), which had the potential to deploy personnel and/or practical resources if required.

10.6 The local authority most directly concerned was Auckland Council, given its responsibilities for local emergency management. Its council-controlled organisations, Auckland Transport and Panuku

## 10 Communication and coordination during the outage

Development Auckland, were also involved. Other local authorities with an interest included NRC and the Waikato Regional Authority.

### How and when information was shared

- 10.7 Table 6 sets out the steps that were taken to communicate information and establish coordination mechanisms, across the period of the outage.

#### *Initial communication about the outage*

- 10.8 As soon as it identified the site and confirmed the leak on Thursday 14 September, Refining NZ informed its senior management team, the Minister of Energy and Resources, MBIE, WOSL, and the supply managers of its fuel company customers that the RAP had experienced a leak. Others, including First Gas, were also informed through the course of the day.
- 10.9 An email to the fuel company supply managers at 3.30pm said, “at this stage we do not anticipate an impact on Auckland product supply”, but that supply managers would be kept updated as new information came to hand. A second email just after 4pm advised that “very first indications are that we may experience a minimum of 48 hour outage of the RAP. This is preliminary and may prove to be conservative. We will keep you informed.”
- 10.10 The estimate of 48 hours was confirmed as still being current at the end of the day. Refining NZ confirmed it for supply managers, released a Facebook post, and prepared a media statement, which it shared with the fuel companies and MBIE but did not release publicly. The draft statement said that “an early estimate is that the pipeline recovery and repair will take two days to complete, after which a controlled restart of the pipeline will take place.” This is consistent with what MBIE, WOSL, Air New Zealand, and others told us that they understood on that first day.
- 10.11 As the site was excavated during the following day, Refining NZ updated its message to the supply managers on the possible repair time. It held a teleconference with them at 11am, noting that the full scope of the repair would not be known until the pipe could be visually inspected. The supply managers were informed that the repair could take between two days and a week (from the following morning), depending on what type of repair was needed. The fuel companies passed that information on to MBIE.
- 10.12 On Friday afternoon, the fuel companies advised the airlines and MBIE that they would be imposing rationing of fuel at Auckland Airport at 90%, as of midday the following day. They also advised MBIE that there were good levels of petrol and diesel on hand at the refinery and they were trucking more from Tauranga to conserve stocks at Wiri.
- 10.13 It was 6pm on Friday night when Refining NZ exposed the pipe and realised that the problem was substantial. Refining NZ’s board was informed at 6.30pm that the repair would take longer and serious rationing would be needed. The board includes representatives from the fuel companies. At 6.50pm, the supply managers in those companies were told it was not a pinhole leak and that the repair time was not known, but would probably be at least a week.
- 10.14 Across the morning on Saturday 16 September, Refining NZ confirmed to the supply managers, and later to MBIE, that the damage was larger than a pinhole leak and that the estimated time to repair would be 10–14 days from that day. MBIE passed the news on to DPMC, other senior officials, and Ministers. Supply managers passed the news on to their customers.

## 10 Communication and coordination during the outage

**Table 6: Communication activities during the 2017 outage**

Date	Pipeline repair steps	Communication and coordination steps
Thurs 14	<b>11:56am: Fuel stops flowing in RAP</b> 2.40pm: Refining NZ finds leak site, secures it, contains leak.	<b>By ~4pm: Refining NZ informs WOSL, fuel companies, Minister, MBIE about leak, indicates estimated repair time of 48 hours, and that at that stage they do not anticipate an impact on Auckland product supply.</b> Fuel companies inform airlines about leak and estimated 48-hour repair time. Refining NZ posts on Facebook about leak and expected repair time.
Fri 15	<b>6pm: Refining NZ exposes pipe.</b>	<b>11am: Refining NZ tells fuel companies that revised estimate is 2–7 days from the following day.</b> 2.30pm: MBIE told about estimated repair time; MBIE advises MCDEM. ~4pm: Fuel companies advise there will be jet fuel rationing at 90% at Auckland Airport, effective from midday the following day. ~6.30pm: Refining NZ board and fuel companies told damage is substantial, repair will take longer, and significant jet fuel rationing will be needed.
Sat 16	Refining NZ assesses damage, repair options.	<b>10am–12pm: ~Refining NZ informs fuel companies, MBIE that repair estimate is 10–14 days.</b> MBIE tells DPMC, Ministers about estimated repair time. Fuel companies consult airline representatives about proposed rationing. <b>3.12pm: NOC report indicates that there will be fuel rationing at Auckland Airport at 30%, effective immediately.</b> Fuel companies tell airlines about fuel rationing decision. DPMC activates National Security System and calls Watch Group meeting.
Sun 17	Refining NZ begins to remove and replace damaged section of pipe.	Refining NZ notifies New Zealand Stock Exchange (NZX) of leak and estimated repair time. Meeting of MBIE, MOT, and MCDEM. Teleconference of central and local government agencies, Refining NZ, fuel companies, Auckland Airport, and airlines. 11:30am: ODESC decides to use NCMC to coordinate the response. Fuel companies tell MBIE repair will take 12–16 days. MBIE asks fuel companies for information on fuel stocks. MBIE issues situation report. Refining NZ tells Minister's office about expected timeline. <b>9.18pm: MBIE tells Refining NZ they are central point of contact for the Government.</b> Refining NZ tells MBIE of expected timeline.
Mon 18		<b>6am: Officials begin to use NCMC, led by MBIE (14 agencies from central and local government involved).</b> <b>Daily "chief executives teleconference" established between the Government and industry.</b> Watch Group meeting; ODESC meeting. Z Energy representative joins NCMC to help with communication.
Tues 19		Daily "chief executives teleconference". Refining NZ representative joins NCMC.
Wed 20		Daily "chief executives teleconference". Government begins daily press conference. Watch Group meeting; ODESC meeting. <b>ODESC creates new Fuel Security Working Group (FSWG) to operate out of Auckland Airport. CE of MOT to Auckland to chair it. Key aim is to provide a single view of fuel stocks and flows.</b>
Thurs 21	New section of pipe welded into place.	Daily: <ul style="list-style-type: none"> <li>• "chief executives teleconference"</li> </ul>
Fri 22	Lloyd's approves repairs.	<ul style="list-style-type: none"> <li>• press conference</li> </ul>
Sat 23	Repairs certified.	<ul style="list-style-type: none"> <li>• FSWG meeting</li> </ul>
Sun 24	<b>Pipeline resumes operation.</b>	<ul style="list-style-type: none"> <li>• MBIE monitoring fuel stocks &amp; validating data.</li> </ul>
Mon 25	<b>First jet fuel certified, available at airport.</b>	Watch Group meeting on 22 Sept.
Tues 26		
Wed 27		Daily press conference. Debrief session at NCMC, before it closes down.

## 10 Communication and coordination during the outage

- 10.15 On Saturday afternoon, after consulting with airline representatives, the Operating Committee of the JUHI decided that fuel would be rationed at Auckland Airport at 30%, effective immediately. A draft of the proposed NOC communication notifying the decision was sent to Air New Zealand for review, before being sent out at 3.12pm. The fuel companies also told their individual airline customers and Auckland Airport about that decision that afternoon. Air New Zealand, for example, received a formal email about the allocation from Mobil at 4.24pm, and from BP at 5.25pm. The Mobil email included the total amount of fuel available to Air New Zealand over the first five days under the rationing regime. The BP email included further explanation of how the rationing would work.
- 10.16 Refining NZ issued a statement to NZX about the leak on Sunday 17 September. It was published when the market opened on Monday 18 September.

### ***Coordination efforts over the first few days of the outage***

- 10.17 Over those first few days, the companies involved all took steps to coordinate information and activity.
- Refining NZ and the three fuel companies all initiated their internal emergency response procedures immediately. These protocols are designed to ensure internal communication to, and oversight by, appropriate personnel and to confirm roles and responsibilities internally to ensure effective decision making.
  - The three fuel companies set up several joint working groups to coordinate different work streams, including a group of supply managers to coordinate all activities and one group specifically tasked with ensuring integrity of internal and external communications.
  - Mobil, as the current chair of the supply managers' forum, became the lead for the response (including the working teams and the communications team) on behalf of the three fuel companies.<sup>59</sup>
- 10.18 Based on the advice from Refining NZ and the fuel companies, MBIE's initial assessment on Thursday 14 September was that a 24- to 48-hour outage was unlikely to cause supply issues. They maintained a watching brief and awaited information updates from Refining NZ and the fuel companies. When the estimated repair time changed from 48 hours to up to one week, MBIE alerted the Minister's office and MCDEM, and informed them that rationing at 90% was to be imposed. MBIE also prepared advice on indicative impacts if the outage were to last longer than a week.
- 10.19 Around the middle of the day on Saturday 16 September, Refining NZ and then Mobil advised MBIE that the repair would take 10–14 days. At that point, MBIE informed DPMC and continued to communicate with fuel companies and Refining NZ to obtain regular updates.
- 10.20 In the evening, MBIE briefed senior Ministers by teleconference. It was agreed that the Minister of Energy and Resources would assume the role of lead Minister for the response. That evening, DPMC convened a Watch Group, made up of representatives from MBIE, MOT, DPMC, MCDEM, and New Zealand Police, to monitor the situation. DPMC also scheduled a meeting of ODESC for Sunday morning.
- 10.21 On Sunday 17 September, a teleconference was held between MBIE and the fuel companies, as well as with other departments, regional emergency management bodies (Auckland CDEM, Waikato Emergency Management), Refining NZ, Auckland Airport, and airline representatives. Later that morning, ODESC met and, among other things, decided to appoint MBIE as the lead agency, supported by MCDEM, MOT, and NZDF. It was decided that MBIE would use the NCMC in the bunker below the Beehive to help with communication and coordination.

<sup>59</sup> The task of chairing the supply managers' forum rotates between the three fuel companies.

## 10 Communication and coordination during the outage

- 10.22 The Government's response efforts continued on Monday 18 September, now based in the NCMC and led by MBIE. Officials from the relevant government agencies, including MCDEM, MOT, and NZDF, were involved and were communicating with Auckland Council, NRC, and Auckland CDEM, as well as fuel companies and Refining NZ. That evening, they were joined by a representative of the fuel companies (provided by Z Energy), and the following morning, by a representative from Refining NZ. We were told that the initial work of the team based in the NCMC focused on two main priorities: information gathering and preparing government agencies to support industry where necessary and appropriate.
- 10.23 A "chief executives' daily teleconference" was established between government and industry, which included the chief executives of MBIE, DPMC, and MOT; officials from the NCMC, Auckland Council, and other government agencies; and representatives of BP, Z Energy, Mobil, Refining NZ, Air New Zealand, Qantas, Board of Airline Representatives New Zealand (BARNZ), and Auckland Airport.
- 10.24 Between Sunday and Wednesday, MBIE began to gather information from fuel companies about jet fuel and ground fuel stock levels, to build a picture of the situation and prepare for any further contingency.

### ***The establishment of the Fuel Security Working Group***

- 10.25 After two more days, following one of the teleconference meetings, the ODESC chief executives decided to send an ODESC chief executive to Auckland to convene face-to-face meetings on the ground there, to enable more effective communication. The chief executive of MOT was nominated and went to Auckland that afternoon. Everyone we talked to confirmed that this step markedly improved the communications and reliability of information being shared.
- 10.26 From the afternoon of Wednesday 20 September, the FSWG met, in person, at Auckland Airport. It included representatives from the airlines, BARNZ, Z Energy, Mobil, BP, Auckland Council, MBIE, Auckland Transport, Refining NZ, Auckland Airport, MCDEM, MOT, KiwiRail, and NZDF. The minutes from the first meeting state that the purpose of the meeting was "to create one version of the truth by bringing together and clarifying information". Its main advantage was that it put everyone in one room, rather than expecting information to cascade through the normal succession of commercial relationships.
- 10.27 The FSWG met in person or by teleconference daily between 20 and 27 September. It is clear from the submissions of many parties that the formation of the Working Group provided a significant shift in the coordination of information and response across the sector. One party said:

*Given the diverse range of complex, commercially focussed stakeholders, this forum became a critical cog in forming a consistent picture and obtaining key information.*

### **Challenges in communication and coordination**

- 10.28 The evidence received by the Inquiry showed that over the course of the outage, both government and industry worked hard in a difficult situation to keep each other informed of developments, to build a clear picture of the extent of the problem, and to coordinate their efforts.
- 10.29 However, several parties told us communication was a challenge over the first few days of the outage.
- 10.30 Some parties told us that they were initially uncertain about the scale of the outage and the appropriate response. A degree of uncertainty across the first 48 hours was unavoidable, as the scale of the damage to the pipe became apparent. However, two specific points were raised:
- Some parties suggested that Refining NZ was too low key in its early message and gave too much emphasis to the possibility of a pinhole leak that could be fixed within two days. They thought

## 10 Communication and coordination during the outage

Refining NZ should have been clearer about what they did and did not know during that first 48 hours.

- Some parties described an absence of a shared understanding of the seriousness of the incident and the appropriate level of response.

10.31 As the outage continued, there were other challenges in exchanging, collating, and processing information about stocks to build a single picture of available fuel across the supply chain and across the country, and to keep that picture updated. We were told that the challenges included:

- frustration from industry in receiving multiple requests from different parts of government, including for data that they did not have readily available or that had commercial sensitivities or competition law issues that needed to be worked through;
- difficulty for the government in processing and aggregating diverse data, and slower than expected responses from industry in the early days; and
- airlines having difficulty understanding the immediate practical situation for their individual fuel allocations.

10.32 We note that some parties have already reviewed what happened and identified lessons from this event. In particular, MBIE carried out a thorough review of their response in November 2017, soon after the event. That review identified areas where they had experienced difficulty and steps to address those matters. We draw on this review in the description and analysis that follows.

### ***The early message from Refining NZ***

10.33 The documents that we have seen, and reports to us from various parties, have confirmed that the early message from Refining NZ on Thursday afternoon was that the pipeline was likely to be fixed within 24–48 hours. By 11am on Friday, the time estimate changed to 48 hours to a week to achieve a repair. However, Refining NZ had no information on the scale of the damage for the first 30 hours. Their time estimate was based on an assumption that it was likely to be a pinhole leak that could be fixed easily with a clamp.

10.34 Refining NZ told us that it considered a pinhole leak caused by localised corrosion was the most likely cause, based on industry knowledge and the apparent absence of any evidence at the site of outside interference. It had a repair plan and equipment ready for a leak of this kind.

10.35 Refining NZ kept the fuel companies and government up to date with developments as they occurred. As soon as they understood the full extent of the damage, on Friday night, Refining NZ immediately informed its board and the fuel companies. Refining NZ informed others, including MBIE, the following morning.

10.36 However, several parties criticised Refining NZ's approach as having given too much reassurance during the first 48 hours. Our review has shown that the early message from Refining NZ in the first 24 hours meant that government agencies did not activate any crisis response systems over this initial period. This response contrasts with that of the fuel companies and Air New Zealand. For example, BP told us that their approach was always to assume the worst at the outset, then “walk the response back” if the issue proved to be smaller. Air New Zealand also decided on Friday afternoon to begin bringing in fuel on flights from Australia and other New Zealand airports, even though it did not learn the true extent of the outage until the next day.

10.37 Refining NZ told us that it tried to give a balanced view in all its external communication, and to strike the right line between creating unnecessary alarm and being overly reassuring. As a listed company, it

## 10 Communication and coordination during the outage

was conscious of meeting its obligations under the New Zealand Listing Rules. All parties were conscious of the need to avoid creating an environment where people started to panic-buy fuel.

10.38 In our view, the message conveyed by Refining NZ was overly optimistic in the first 24 hours. Parties, particularly those that were one step removed, such as airlines, took it at its word that the problem should be resolved within one or two days. They were later surprised when this proved not to be the case. We consider that this change exacerbated the confusion and stress of the situation.

### ***A shared understanding of the outage and the appropriate response***

10.39 Some parties noted that there was no shared understanding of what the response should be in the initial stages. For example, one party explained that while it knew how to respond to disruption events, it “does not know how that response necessarily corresponds with that of others”, and that “more coordination at the front-end about how parties view the seriousness of a fuel supply disruption event would be helpful”.

10.40 Other parties outside the fuel industry, as well as local government, also noted that there were different understandings about who should be doing what during the outage. For example, Auckland Council expressed concern that they were not advised directly by the fuel sector about fuel stocks, despite their responsibility for lifeline utilities in the region.<sup>60</sup>

10.41 While there was regular communication between the different parties, it appears that until several days into the outage, there was no explicit conversation between the parties to ensure they all had a shared understanding of how the response effort should be managed.

10.42 To be clear, the situation never reached the threshold for the Government to declare either a fuel shortage under the Petroleum Demand Restraint Act or a local or national emergency under the CDEM Act, and so these frameworks were not invoked. MBIE told us this meant that the core of the government role was to monitor the situation in case problems escalated, and to provide logistical support to a response that was otherwise led by industry.

10.43 MBIE also told us that they used the 2012 Fuel Plan to guide their response, but did not invoke it explicitly, as parts of the framework were unnecessary. For example, it decided to deal with just those fuel companies that were affected by, and responsible for, the RAP outage, through the companies’ nominated representative (Mobil), rather than engaging with all fuel companies in the particular structure required by the plan.

10.44 These assessments were reasonable responses to this specific situation. However, in our view, it would have been preferable for have had more direct discussion, at an early stage and among all parties who could have a role in the response, about the status of the issue in terms of CDEM and the 2012 Fuel Plan. This would have allowed all parties to understand exactly where the issue stood in a shared framework. It does not appear that this discussion ever took place. We think this added to the uncertainty, particularly for those who were not as intimately involved in the response.

10.45 The Inquiry’s view is that there is scope for MBIE to take more of a leadership role in ensuring this shared understanding across all relevant parties. This is an important step, even when it is assessed that the level of the outage is such that industry can effectively manage the response.

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<sup>60</sup> The Auckland CDEM Group did request and receive information about stocks and tanker movements on Saturday 16 and Sunday 17 September 2017. On request, Auckland CDEM also provided information to fuel companies about critical aviation customers and their fuel needs.

### **Sharing information about fuel stocks**

- 10.46 Once the extent of the outage was understood, the fuel companies, in consultation with representatives from the airlines, decided to ration jet fuel at Auckland Airport to 30%. The final decision was communicated promptly to the airlines and Auckland Airport directly, as well as through NOC communications. The fuel companies told government there were sufficient stocks of jet fuel to cover up to 14 days of demand at that 30% allocation, and sufficient ground fuels to meet normal demand over the expected outage period.
- 10.47 MBIE told us it did not need information about stock levels that was more detailed to be able to carry out its role at that time. However, over the next few days it needed to obtain a bigger picture of the situation, to build its understanding of stock levels and flows around the country. It also needed to monitor how well airlines were tracking against the allocation, so that it could provide assurance to Ministers and make plans in case any further disruption took place.
- 10.48 From Sunday 17 September, MBIE made a series of requests for relevant information from fuel companies, including daily reports of stock levels of jet fuel at Wiri and JUHI, as well as stocks levels and replenishment schedules at other ports and airports around New Zealand. MBIE also asked the fuel companies to report daily on some information about retail stocks for ground fuels, as well as information about truck logistics.
- 10.49 MBIE told us that in requesting this information, they were guided by information-sharing protocols from the 2012 Fuel Plan; however, some types of information that they requested (in particular, retail-level information) went beyond this plan.
- 10.50 MBIE noted it was more challenging than expected to obtain certain information. They had some concerns that aggregated fuel stock information, covered by the 2012 Fuel Plan, was not initially provided as promptly as expected. For example, they told us they received information about jet fuel levels at Wiri and JUHI later than anticipated on Monday and Tuesday. MBIE told us that some companies were slow to provide the company-specific information and they had to take additional steps to obtain cooperation from some fuel companies.
- 10.51 For their part, some of the fuel companies told us they were frustrated by frequent requests for information from different parts of government, often for the same information or for information that they knew was irrelevant, or for information that the fuel companies did not necessarily hold themselves (such as retail-level information). To them, it seemed that officials did not sufficiently understand how the system worked to know what to ask for, or what the information they were getting meant. Mobil expressed this in their submission:
- Throughout the pipeline outage, Mobil received highly granular data requests from multiple government agencies, often duplicated requests, meaning resources who were actively working to mitigate the impacts of the disruption were diverted from their core activity to hear and respond to requests or provide this data.*
- 10.52 We heard that similar information was requested by MCDEM and NZDF, and in some cases, the Minister's office. We also heard that that some information requested, particularly the information around ground fuels at retail sites, was not information that all fuel companies had immediate access to. In some cases, the information was sensitive and could not be shared between competitors.
- 10.53 From what we heard, it seems that a range of factors contributed to this initial difficulty in communication:
- MBIE response staff were not sufficiently familiar with the types of information that they received and did not have a full understanding of what information was appropriate to request or would be

## 10 Communication and coordination during the outage

held by the fuel companies,<sup>61</sup> and what assurances might be required to allow the fuel companies to share that information.<sup>62</sup>

- MBIE response staff were also unfamiliar with emergency management procedures, including NCMC processes.<sup>63</sup> This resulted in some initial confusion between the roles of MBIE, MCDEM, and NZDF, among others. Key communication channels were not established, which in turn led to high amounts of information being requested and received.<sup>64</sup>
- On the part of the fuel companies, there was a corresponding lack of confidence in how information would be used, given the sensitivities around commercially sensitive information and the sharing of data between competitors. This required MBIE to engage at very senior levels to obtain the cooperation of the fuel companies in providing information.
- These factors led to a delay in information being provided and collated, and this in turn led others to turn to informal channels to obtain information.

10.54 By all accounts, these communication difficulties were largely resolved by Wednesday 20 September. However, in the Inquiry's opinion, communication over the initial five or six days could have been improved by ensuring there were regularly revised and well-rehearsed plans, including protocols for the sharing of information around stock levels and for providing the necessary assurances to industry.

10.55 During the forum we held, we were repeatedly told by the industry that response plans must be kept "live" through regular discussion, revision, and practice. Although the 2012 Fuel Plan provided some guidance to MBIE on communication, it did not provide the necessary tools in this case. More regular revision and practice of the Plan might have ensured that the protocols covered all types of information that would be required by government and that any necessary competition law issues were worked through in advance.

### **Our findings on the communication and coordination efforts during the outage**

10.56 We find that over the course of the outage, both government and industry worked hard in a difficult situation to keep each other informed of developments, to build a clear picture of the extent of the problem, and to coordinate their efforts.

10.57 Even so, it was clear that there were communication difficulties experienced by all parties over the first few days of the outage.

10.58 These difficulties were resolved over time and communication was greatly improved by Wednesday 20 September. As noted, many parties particularly commented that the development of the FSWG was helpful in improving communication across the sector.

10.59 In our view, Refining NZ was too optimistic in its early message over the first 24 hours that the outage would take 24–48 hours to resolve. This was based on an assumption on their part that the problem was a pinhole leak, at a time when they had no information on the extent of the damage. It would have

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<sup>61</sup> MBIE noted that in a subsequent review of information-sharing protocols in early 2018, they concluded that retail stock information was not useful, could not easily be provided by the companies, took valuable resources away from other activities, and therefore would not be requested in similar circumstances in the future.

<sup>62</sup> In their internal review in 2017, MBIE noted that there was a "lack of clarity on how information would be used", which led to fuel companies' concerns regarding sensitive information and resulted in stalled communications and delays. See MBIE, "Final Refinery to Auckland Pipeline Disruption Event Report", 3 November 2017, pp 25–26.

<sup>63</sup> MBIE, "Final Refinery to Auckland Pipeline Disruption Event Report", 3 November 2017, p 24. A post-event review by MCDEM in September 2017 also identified that some (but not all) MCDEM staff felt that there was a level of confusion around the respective roles of MBIE and MCDEM.

<sup>64</sup> *Ibid*, p 25.

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been better if they had simply said they were investigating and should be able to say more once they had excavated and reached the pipeline. They could have given a time estimate for how long it would take to reach that point. We consider that this initial message added to the uncertainty in those early days.

- 10.60 However, as soon as they had seen the damage, Refining NZ provided clear and accurate information regularly to all those who needed to know.
- 10.61 This issue may not have made any difference to the timing of the decision by the fuel companies to move to ration jet fuel to 30% of normal allocations. That decision was made promptly once the full situation was understood and it was communicated quickly to the airlines.
- 10.62 In addition, while many parties independently took similar approaches to the outage, there was no shared understanding in the early days about the appropriate level of response. For example, there were different views on whether government involvement was needed at all, with some suggesting that the issue was within the scope of what could be managed by the fuel companies, without further help. We have concluded that there is scope for MBIE to take more of a leadership role in the early days of a disruption, to ensure there is a common understanding of the situation.
- 10.63 Even after the extent of the outage was understood, there were ongoing difficulties in gathering and collating data on fuel stocks to build a bigger picture of the issue and plan for any further contingency. This was partly due to a lack of familiarity among officials with the types of information held and commonly shared by industry, and the sensitivities around it, as well as a lack of confidence on the part of industry with regard to how the information would be used.
- 10.64 We find that the sharing of fuel stock information in the early days could have been improved if there had been clear, agreed, and tested protocols for obtaining information on stock levels that could have been picked up and used as soon as the extent of the outage was known. The existing protocols were insufficient for the types of data requested and the communication channels needed in this crisis. Regular revision and rehearsal of emergency plans could ensure that useful protocols are available and understood.
- 10.65 We acknowledge the efforts MBIE has already made through their own review work to identify areas for improvement, including the development of new information-sharing protocols. We encourage them to continue working on these improvements.

## 10 Communication and coordination during the outage

### Summary of our findings

- All parties worked hard in a difficult situation to keep each other informed of developments, to build a clear picture of the extent of the problem, and to coordinate their efforts.
- Even so, there were clear difficulties in communication over the first five days.
- Refining NZ:
  - was too optimistic in its early message, during the first 24 hours, that the outage would take 24–48 hours to resolve, at a time when it had no information on the extent of the damage;
  - provided clear and accurate information regularly to all those who needed to know, as soon as it understood the extent of the damage to the RAP.
- Initially, there was no common understanding of the scale of the outage or the level of response required across the sector, to ensure that all parties were working from the same page.
- Once the outage was understood, the fuel companies promptly communicated a broad understanding of the stock situation to airline customers and to government. However, there were ongoing difficulties with regard to gathering and collating data on fuel stocks to build a bigger picture of the issue.
- The communication in the initial days of the 2017 outage could have been improved if:
  - MBIE had taken more of a leadership role in the early days to ensure that there was a common understanding of the scale of the disruption and the appropriate response level;
  - there had been well-rehearsed plans to create a shared understanding of the response level across the whole of the sector, as well as establishing key communication channels from the outset;
  - there were clear, agreed, and tested protocols for obtaining information on stock levels that could have been picked up and used as soon as the extent of the outage was known.
- Straight after the event, MBIE carried out a comprehensive review that identified challenges in communication during the response, as well as areas for improvement. It is currently working on these matters.

## 11 Managing the effects of the outage

- 11.1 By the morning of Saturday 16 September, Refining NZ was estimating that it would take another 10–14 days for the RAP to be operating again. This focused all parties on the stocks of fuel that were available in Auckland, how to make it last, and how to bring in product without the RAP. This chapter discusses the steps that were taken.
- 11.2 Table 7 shows the fuel stocks at Wiri on the day of the outage (14 September), the day the repair time frame was confirmed (16 September), and the last day before the RAP started operating again (24 September).<sup>65</sup> It clearly shows the way the fuel stocks were depleted across those 10 days.

**Table 7: Fuel stocks at Wiri, 14, 16 and 24 September 2017**

Fuel type	14 September	16 September	24 September
Petrol 95	1.5 days/0.689 million litres	0.1 days/0.02 million litres	0.0 days/0.01 million litres
Petrol 91	9.2 days/20.9 million litres	7.3 days/16.6 million litres	3.2 days/6.5 million litres
Diesel	5.5 days/11.9 million litres	4.8 days/10.4 million litres	2.0 days/3.7 million litres
Jet	6.6 days/24.2 million litres	4.8 days/17.8 million litres	1.3 days/4.1 million litres

- 11.3 Table 8 summarises the steps that were taken across the period of the outage.

### Managing the consequences for jet fuel supplies

- 11.4 The outage removed the only existing supply line for jet fuel into Auckland Airport. While there was a good amount of jet fuel at Wiri, the JUHI tanks held less than normal because one tank was being serviced and so was out of use. To cope with the outage, the parties took steps to ration the use of jet fuel significantly and to find and establish alternative methods of supplying jet fuel to Auckland Airport.

#### *Rationing fuel at Auckland Airport*

- 11.5 As information on the scale of the potential outage became available, the three fuel companies followed established procedures to impose restricted allocations of jet fuel to the airlines. This approach is used internationally at airports whenever normal supply is disrupted. It involves setting a limit on the fuel that airlines can take from the airport, at a set percentage of their normal fuel use. For example, rationing to 80 or 90% of normal fuel use might occur if a weather event delays a ship. More severe rationing is rare.
- 11.6 A 30% allocation was imposed, effective from midnight on Saturday 16 September 2017. This meant airlines were allocated 30% of their usual usage at Auckland Airport. Each airline was told their total allocation amount over the following five days and it was up to the airlines to manage how they used that allocation. The restriction did not mean that only 30% of normal flights could proceed. Airlines have many ways to manage fuel restrictions at one airport. Each airline worked with its own fuel suppliers to put those into action. For example, they:
- used other domestic airports to refuel where possible;
  - brought in more fuel on inbound flights where possible, to supplement outbound flights;

<sup>65</sup> Figures taken from daily stock holdings summaries provided by WOSL.

## 11 Managing the effects of the outage

**Table 8: Steps taken to manage the effects of the outage in 2017**

Date	Pipeline repair steps	Steps to manage fuel supplies
Thurs 14	<b>11:56am: Fuel stopped flowing in RAP</b> 2.40pm: Refining NZ finds leak site, secures it, contains the leak.	
Fri 15	<b>6:00pm: Refining NZ exposed the damaged pipe.</b>	~4:00pm: Fuel companies advised there would be jet fuel rationing at 90% at Auckland Airport, effective from midday the following day. Air New Zealand began to fly in tanks of jet fuel.
Sat 16	Refining NZ assessed damage, repair options.	Refining NZ began work on a truck-loading facility at Marsden Point for jet fuel. MOT, MBIE investigated options for overweight fuel trucks on roads. <b>3:12pm: NOC report advised that there would be rationing of jet fuel at Auckland Airport at 30%, effective immediately.</b> Airlines started on contingency arrangements (tankering in fuel, refuelling at other airports, reducing loads, cancelling flights). Fuel companies started to arrange to supply extra jet fuel to other airports, to enable refuelling out of Auckland. Fuel companies started to arrange for ground fuels to be supplied to Auckland from other ports (e.g., Wynyard Wharf, Mt Maunganui).
Sun 17	Refining NZ began to remove damaged section of pipe.	MBIE, NZDF discussed options for NZDF help with fuel companies. MBIE, Immigration changed transit visa rules so that planes could stop to refuel.
Mon 18		
Tues 19		Refining NZ's truck-loading facility completed, subject to approvals. Options for a fuel barge, using NZDF jet fuel trucks, assessed and discarded. Confirmed that airport JUHI needed modifications to receive jet fuel from trucks. Option of using <i>HMNZS Endeavour</i> to transport fuel assessed. Confirmed that NZDF could provide 20 certified truck drivers. Contingency option of diesel from Huntly (Genesis Energy) agreed.
Wed 20		NZTA and Auckland Council considered driver, load, and route permits for trucking jet fuel. Wynyard Wharf chemical tanks conversion to jet fuel storage assessed. Refining NZ trialled jet-fuel-loading gantry at Marsden Point. NZDF asked for staff to help with unloading at JUHI.
Thurs 21	New section of pipe welded into place.	<i>HMNZS Endeavour</i> travelled from Devonport to Marsden Point.
Fri 22	Lloyd's approved the repairs.	Decision not to use <i>HMNZS Endeavour</i> . <b>Jet fuel started being trucked from Marsden Point to JUHI (91,000 litres).</b> Three trucks made available for transport of jet fuel. Jet fuel restrictions raised to 50%.
Sat 23		<i>HMNZS Endeavour</i> returned to Devonport. Wynyard Wharf received fuel filter from NZDF. <b>MT Matuku delivered 1.5 m litres of jet fuel to tank on Wynyard Wharf.</b> Jet fuel trucked from Marsden Point (122,000 litres).
Sun 24	<b>Pipeline resumed operation.</b>	Jet fuel trucked from Marsden Point (150,000 litres).
Mon 25	<b>First jet fuel (from pipe) certified, available at airport.</b>	NZDF on site at Wynyard Wharf to assist. Jet fuel restrictions raised to 80%. Additional truck available for transport of jet fuel.
Tues 26		<b>First jet fuel trucked to JUHI from Wynyard Wharf.</b> Two additional trucks available for transport of jet fuel.
Wed 27		
Thurs 28	First fresh jet fuel available at Auckland Airport.	
...		
Sat 30		Jet fuel allocations removed; supply back to 100%.

- made “technical stops”, diverting outbound long-haul flights, to allow refuelling at Australian or Pacific island airports;
- reduced cargo or passenger numbers, to reduce the fuel used for individual flights;
- flew in some aircraft without passengers, specifically to transport in fuel; and
- where necessary, cancelled some flights.

11.7 These efforts by airlines kept flight cancellations to a minimum. They required substantial effort by the airlines and there was still disruption for passengers whose flights needed extra stops, with delays and missed connections.

11.8 Other parties took steps to help as well:

- Auckland Airport allowed more flights to use a fuel-efficient approach path and facilitated wing-to-wing transfer of fuel between planes.
- The fuel companies brought some additional fuel into other regional airports, to enable higher jet fuel use in those ports.
- Z Energy worked with Christchurch Airport to enable throughput of double their usual jet fuel volumes, to support the fuelling stops at that airport.

11.9 The restrictions were gradually lifted as certainty around the repair of the pipeline grew. Allocations were lifted to 50% on Friday 22 September after the pipe repair had been completed. They were raised again to 80% from Monday 25 September, after the first batch of fuel had arrived at Wiri through the RAP.

11.10 Allocations were finally lifted back to 100% on 30 September, 17 days after the initial pipeline shutdown.

### ***Finding other ways to transport jet fuel to Auckland Airport***

11.11 The fuel companies, together with Refining NZ, also looked for alternative ways to bring jet fuel to Auckland Airport, considering several different options. Across the course of the outage they managed to create two temporary methods for transferring jet fuel from the refinery to the airport:

- truck transfer of fuel from the Marsden Point refinery to the JUHI; and
- transfer by ship from Marsden Point into Wynyard Wharf in Auckland, followed by truck transfer from the wharf to the JUHI.

11.12 These supply routes had to be set up from scratch. It took a lot of work to get all the necessary legal arrangements and approvals in place, to put in place new or modified infrastructure and equipment, and to test all the equipment and procedures, before they could become operational.

11.13 For the trucking option, the tanks holding jet fuel at the refinery did not have facilities to allow trucks to load directly from the tank. Refining NZ immediately began work on converting a jet tank to allow trucks to load, with the help of experts from BP. The facility was completed by 19 September, but it took a further three days to be tested and approved by the fuel companies who would be using it, before trucking began. The fuel companies supplied the trucks and NZDF provided some drivers. The first two trucks transferred fuel from Marsden Point to JUHI on 22 September, eight days after the RAP shut down and only two days before it became operational again.

11.14 Over the same period, BP worked to establish a system to ship jet fuel directly to Auckland. Wynyard Wharf had tanks that had been used for petroleum before the RAP was built. More recently, the wharf has been managed by Stolthaven, which uses the tanks for storing chemicals. BP arranged with

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Stolthaven to clean and modify three tanks so they could receive jet fuel from a tanker. COLL arranged for the ship *MT Matuku* to be loaded with jet A1 at Marsden Point and transport it to Auckland. The ship began to transfer the fuel to the tank in Auckland on 23 September. That was followed by a necessary waiting period and the resolution of some final technical issues. On 26 September, trucks supplied by the fuel companies began transferring fuel from Wynyard Wharf to the JUHI. This was two days after the RAP was operating again, but it helped to replenish jet fuel stocks.

- 11.15 Both temporary supply routes needed cooperation from other parties to manage the additional truck traffic:
- NZTA gave approval for trucks carrying jet fuel to use the Johnstone Hill Tunnel at the northern end of the Northern Motorway, which made the road journey from Marsden Point faster.
  - Panuku Development Auckland needed to put in place traffic management plans for truck movements on Wynyard Wharf.
  - Auckland Transport worked with the fuel companies to confirm trucking routes and allow the use of bus and transit lanes.
  - Auckland Airport put in place traffic management plans for trucks bringing fuel into the JUHI, which is close to roads around the domestic terminal.
- 11.16 The use of both these supply routes was limited by the truck-loading or discharge equipment at each end. For example, the Marsden Point tank could allow only one truck to load at a time and the Wynyard Wharf facility could support a maximum of six truckloads per day. At the JUHI, the WAP had to be stopped as appropriate to allow for truck transfer into the JUHI.
- 11.17 Another significant limiting factor was the lack of suitable trucks and drivers. Nationwide, only a small number of trucks are equipped and certified to carry jet fuel, and some of these were already being used to support the extra jet fuel being supplied to support refuelling at regional airports. Diesel trucks can be adapted to carry jet fuel, but this conversion can take several days and at this point, all the ground fuel trucks were being used to maintain the supply of ground fuel. In addition, drivers need to have special training before they can operate a jet fuel truck.
- 11.18 The FSWG calculated that it would be desirable to have seven trucks transferring fuel from the refinery to the JUHI – however, only three trucks operated on this route up to 26 September. By 27 September, a total of six trucks were transferring jet fuel to the JUHI from both the refinery and Wynyard Wharf. NZDF provided 18 drivers to drive the trucks, as well as trained staff to help transfer the fuel at both Wynyard Wharf and the JUHI.
- 11.19 In total, around 1.5 million litres of jet fuel was supplied to Auckland Airport via ship and truck from Wynyard Wharf, and a further approximately 700,000 litres was supplied by truck directly from the refinery. Some of this fuel only arrived at the airport after the outage was over, but it did help to replenish jet fuel stocks. Although 2.2 million litres may seem a large amount, it equates to approximately half a day of average daily demand at the JUHI.
- 11.20 Other supply options, and other options to increase the rates of supply, were considered but discarded. For example, the possibility of establishing floating storage in Auckland Harbour was investigated by the fuel companies, but ultimately not pursued. NZDF offered to provide additional road tankers from the vehicles they used on airfields, but these were not used as they were not fitted with the same protectors as typical road tankers and would have required additional safety measures. Options for working with NZTA to increase maximum permissible truck weights and maximum driving hours for drivers were also considered but not pursued.

### Managing the consequences for ground fuel supplies

- 11.21 The management of ground fuel supplies was more straightforward. The fuel companies were able to arrange for COLL to ship ground fuels from the refinery to Mount Maunganui. The fuel companies also organised additional imports of fuel, depending on their customer requirements. All companies managed their respective truck fleets to deliver ground fuels from both Mount Maunganui and the truck-loading facility at Marsden Point into the Auckland area.
- 11.22 As ground fuels are usually delivered by truck, a reasonable number of trucks and drivers were available to support this increased workload.
- 11.23 Diesel supply was supported by using some existing storage at Wynyard Wharf, which received additional diesel directly during the outage. This facility was used to support the Wiri capacity for several months after the outage. *HMNZS Endeavour* was deployed to Marsden Point in case it was needed to transport diesel into Auckland. The Inquiry was told it returned to Devonport when an oil company decided against using a single hulled ship.
- 11.24 NZTA facilitated the additional fuel truck traffic for ground fuels by fast-tracking requests to relax vehicle weight restrictions by granting High Productivity Motor Vehicle permits, and requests to change the requirements regarding driver hours and hazardous substances. Auckland Council also worked with the fuel companies to waive delivery period restrictions.
- 11.25 Across the period of the outage, a small number of individual petrol stations ran out of high-octane fuels, but there was no region-wide shortage. However, by 26 September, at least one fuel company reported a risk of a large number of petrol stations running dry if stocks were not replenished soon.
- 11.26 Towards the end of the outage period, it was clear that ground fuel stocks were running low. For that reason, the Slate Committee that controls the RAP decided that once it started operating again, the first batches through the RAP would be jet fuels, then ground fuels, then jet again, rather than the RAP being used back-to-back for the resupply of jet fuel.

### What was the overall impact?

- 11.27 While the public impact of the outage was kept to a minimum, it should not be understated. Because of the jet fuel rationing, around 270 flights were disrupted, including cancellations, rescheduling, and flights requiring fuel stops. Although there were no overall ground fuel supply restrictions, stocks were starting to run low by the end of the outage, which suggests that the alternative supply routes were not keeping pace with demand. Therefore, the second batch of fuel sent down the RAP, when it resumed, was ground fuel.
- 11.28 The steps taken by the sector minimised the impact of the RAP outage, but they came at a significant financial cost:
- It cost the airlines a lot to minimise passenger and cargo loads, add additional stops, bring in fuel in empty planes, and cancel and reschedule flights.
  - The fuel companies bore the costs of developing the alternative supply methods and bringing fuel to Auckland by truck and ship.
  - Refining NZ paid to establish a new truck-loading facility for jet fuel at the refinery and had to slow down production.
- 11.29 In addition, there was the cost of repairing the RAP, including bringing in equipment and experts from overseas, and remediating the site of the leak. Refining NZ was responsible for most of this expense, but the fuel companies and others provided substantial technical support.

11.30 Eight parties were able to provide the Inquiry with estimates of their direct costs. From these parties alone, the total was around \$25 million.<sup>66</sup> However, most of them stressed that the real costs were much higher. They made no effort to quantify the time that staff, including senior management, spent on the issue, or indirect costs like lost business or the displacement of their normal activities. Nor did this figure include the cost of the time that government agencies put into the outage.

11.31 In addition to these direct costs, there would have been a cost to the economy from reduced or constrained activity. Chapter 1 referred to some modelling work that had been done for MBIE on the costs of different outage scenarios (see paragraph 1.16), including a scenario involving a short-term outage of the RAP or the Wiri facility. The modelling suggested that New Zealand would suffer a loss of \$23 million of GDP.<sup>67</sup>

11.32 The outage also had the following impacts:

- Government agencies and other organisations put in place travel restrictions for their staff.
- NZDF ceased all but essential flying operations, altered its international flight routes to refuel overseas, and cancelled the last week of a jet-flying training exercise with another country.
- Many airline passengers had their travel plans disrupted.
- All parties assume that there was some reputational damage to New Zealand and Auckland as a destination, as well as to the fuel sector and airlines.
- There have been environmental consequences for the land affected, although we acknowledge that Refining NZ made every effort to minimise these.
- The owners of the affected properties at the site of the rupture have all suffered significant disruption and some economic loss, because their land now carries a contamination warning on the title.

11.33 It is also clear that the impacts could have been significantly greater. For example, if the fuel in the pipeline at the time of the disruption had been petrol, there would have been a higher risk of explosion from vapour clouds, as well as a fire risk and greater risk to human life. If the rupture had occurred in a different location – for example, a built-up environment, a remote location that was difficult to access, or a location close to a water source) the costs of repair and the time taken could have been significantly higher.

11.34 In addition, if the repair had taken longer for any reason, the impact of the outage would probably have been worse

- If the outage had continued into the peak travel period during the school holidays, which began on 30 September, the disruptions would have affected a significantly larger number of people.
- The refinery may have had to halt production because of limited storage on site.
- Ground fuel supply would probably have started to struggle to meet demand, affecting transportation across Auckland, including emergency services and public transport. It might have been necessary to start prioritising fuel supplies to lifeline utilities and emergencies, and possibly rationing retail supplies.

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<sup>66</sup> Auckland Airport, Air New Zealand, BP, Mobil, Z Energy, Refining NZ, WOSL, and NZDF provided us with information on their direct costs.

<sup>67</sup> Market Economics Research, *Economics of Fuel Supply Disruptions and Mitigations*, p 66.

### Our findings on the way the effects of the outage were managed

- 11.35 There was extensive cooperation across the sector to manage the fuel supplies during the outage, to minimise the disruption for airline passengers and other consumers. Central and local government did what they could to support the efforts of the private sector companies – for example, by helping the companies work through regulatory requirements quickly.
- 11.36 The result was that effective alternative supply routes were adapted and adequately scaled up in the case of ground fuel. In the case of jet fuel, temporary routes were developed from scratch within the span of one to two weeks.
- 11.37 We acknowledge that people worked hard to find practical solutions quickly. Each company in the fuel industry had good response plans and systems governing their individual actions.
- 11.38 Nevertheless, in relation to jet fuel at least, quite severe rationing was required and airlines had to take strong measures to minimise disruption to passengers as far as possible, at significant cost to themselves. Auckland Airport noted that many of the measures taken by the airlines may not have been possible – at least to the same extent – had the outage occurred during the much busier school holiday period two weeks later, and the effects would then have been more severe.
- 11.39 We find that the fuel sector had not taken practical steps to establish the contingency arrangements, equipment, and approvals it would need to bring jet fuel to Auckland Airport in this type of situation. It had to start from scratch to create temporary alternative supply routes. This caused delay. Fuel only began to be delivered directly from the refinery eight days after the outage began, and the route via Wynyard Wharf did not become operational until 12 days after the outage, by which time the RAP was operating again. In addition, the amount of fuel that could be provided through these routes was small when compared with the normal daily usage at the airport. In essence, it was too little, too late.
- 11.40 It is also important to note that the Wynyard Wharf route is no longer available. This reduces the options for bringing jet fuel to Auckland even further. At present, trucking from Marsden Point is the only back-up option available.
- 11.41 In our view, the fuel sector should have worked through these issues and options in advance, as part of sector-wide preparations for an outage. That would have enabled it to have already worked through the regulatory issues affecting trucking, traffic management, and so on, and would also have meant that the equipment for loading trucks was already in place at the relevant locations. It would also have meant that parties were not distracted by considering options that proved not to be feasible, such as using an NZDF ship to carry fuel.
- 11.42 Wynyard Wharf was an important route for bringing additional diesel into Auckland during the outage. The lack of this option in future creates additional risk. We note that in an emergency situation, a ready supply of diesel can be important for an effective response, particularly for lifeline utilities and activities that may need to use generators to keep functioning.

### Summary of our findings

- There was extensive cooperation across the private sector companies and public sector agencies that make up the fuel sector to find ways to supply fuel and minimise disruptions, including the contribution of personnel from NZDF.
- The fuel sector had not taken practical steps to have in place the equipment and contingency arrangements it would need to be able to bring jet fuel to Auckland Airport in this type of situation. Therefore, it took some time to make temporary arrangements.
- Ground fuel supplies were maintained sufficiently to avoid problems during this outage.
- It is not clear that ground fuel stocks could have continued to be replenished through the alternative supply routes sufficiently to avoid shortages and the need for rationing if there had been a longer outage.
- The removal of the ability to use the tanks on Wynyard Wharf in a future crisis has increased the risks in relation to the supply of diesel and jet fuel.
- There is currently no adequate alternative route for bringing significant amounts of jet fuel to Auckland to supply the Auckland Airport during either a short- or long-term outage.

## 12 Lessons from 2017: The sector needs to be better prepared for an incident

### Planning, preparation, and practice

- 12.1 The 2017 outage was the type of sudden shock to a system that emergency planning and business continuity plans aim to manage and mitigate. It was a useful test of the response systems. It showed us that, at a practical level:
- Refining NZ, supported by others in the sector, was very good at responding to the immediate task of finding the leak in the RAP, containing the spill, fixing the pipe, and minimising the long-term damage; and
  - the fuel sector suppliers and infrastructure operators quickly swung into action to find ways to bring fuel to Auckland, by expanding the existing alternative route for ground fuels and by creating new temporary routes for jet fuel.
- 12.2 However, it also revealed a lack of preparedness at a “whole-of-sector” level. There was a sector-wide response strategy and plan, but it had not been regularly practised in exercises with the sector.
- 12.3 Chapters 10 and 11 set out our findings on the scope for improvement highlighted by the 2017 incident, in the areas of leadership and communication during the incident, and practical contingency arrangements. The types of challenges that were experienced in 2017 are the reason that response plans need to be regularly tested, discussed, and reviewed.

### Putting a new National Fuel Emergency Plan in place

- 12.4 Since before the 2017 outage, MBIE and MCDEM have been working to replace the 2008 Response Strategy and 2012 Fuel Plan with a new National Fuel Emergency Plan. Consultation with the sector on a draft of the new plan was concluding as this Inquiry began. We endorse the comment made by some in the industry that the new Emergency Plan should include a specific section on jet fuel.
- 12.5 We understand that officials will complete the new Emergency Plan this year, taking into account any recommendations in this report. This is useful progress, but it is just a beginning. At the forum we held, and in submissions to us, the industry participants all said that a new plan for sector responses should be developed, practised regularly, and reviewed, in a process of constant improvement. The view was that government – MBIE – should lead this work and coordinate practice exercises and scenarios. As one participant said, “If you’ve written the plan, you then have a duty to make sure it is effective and practised”. All parties said they would participate in such exercises and reviews.
- 12.6 We agree that this needs to be done. In our view, MBIE is being invited to take a strong lead in ensuring the fuel sector is not caught unprepared. It should respond positively and make sure that it has the resources to deliver properly on this responsibility.
- 12.7 The draft plan states that it will be tested in an exercise, and reviewed, every three years. We would like MBIE to consider more frequent exercises and practices with the sector. We think annual exercises would be prudent, at least until MBIE is satisfied that the current problems have been resolved. We also think the plan should give MBIE clear lead responsibility to set a programme of sector exercises. At present, it simply states that MBIE and MCDEM share responsibility to “maintain this Plan”, which we regard as too vague.

### Making the Fuel Sector Coordinating Entity effective

- 12.8 Many people told the Inquiry that it was important to have an effective forum or group for the private sector companies and public sector organisations that together, make up the fuel sector, to meet and talk on a regular basis. In Australia, there is a body called the National Oil Supplies Emergency Committee (NOSEC), which government officials and fuel company representatives told us was valuable. It meets regularly and includes the Commonwealth and all state and territory governments, the Australian Institute of Petroleum, and all the major fuel companies.
- 12.9 Its formal functions revolve around managing the National Liquid Fuel Emergency Response Plan and the response to any actual crisis. We were told that, in practice, it is also a valuable forum for making sure that the government agencies and fuel sector organisations talk with each other, build a shared understanding of how they each function and what they need, and discuss emerging challenges. Having the Government present and facilitating the discussions makes it easier for the competing fuel companies to participate. Without a third party present, competition law may constrain them from meeting and talking in this way.
- 12.10 We asked whether New Zealand should create a similar body. We were told that New Zealand's Fuel SCE, which is set out in the 2012 Fuel Plan and is carried forward into the new draft plan, had roughly the same membership and function, but it needed to be reinvigorated and given a new mandate. The new plan proposes that it will meet at least annually to review the plan.<sup>68</sup>
- 12.11 In our view, it is vital for the Fuel SCE to become an active body that meets regularly and drives a programme of work to improve the sector's emergency response preparations. We strongly encourage MBIE to look to the model provided by NOSEC in Australia, including its terms of reference, the frequency of its meetings, and the scope of the agenda at those meetings.
- 12.12 Communication difficulties sit at the heart of many of the problems in 2017. They will only be solved by finding ways to build:
- good **relationships** between the industry parties and officials, so that people know who to ring for effective communication and action;
  - **knowledge**, so that people can be sure that the person they are talking with understands their business and context and will make sensible use of any information provided; and
  - **trust** between all the parties, so that people can speak directly and openly.
- 12.13 The Fuel SCE is the place to build the relationships, knowledge, and trust. That will take time, so the sooner it starts to meet, the better.

### Information protocols

- 12.14 We understand that there will always be some scrambling at the start of any crisis, while people come to grips with what has happened and initiate the correct communication links. However, one of the aims of emergency plans is to help people move through that phase as quickly as possible and start to think clearly and calmly. In 2017, the scrambling lasted too long.
- 12.15 MBIE acknowledged this in its own review of the way the 2017 outage was managed. That report noted that MBIE needed to increase its knowledge on emergency management procedures and ensure clear communication channels are implemented. When we met with MBIE, they told us they have made progress on their emergency systems training. However, they have not yet completed the

<sup>68</sup> As set out in paragraph 8.18, the current membership is COLL, Refining NZ, Mobil, Z Energy, BP, and Gull. The draft new Emergency Plan proposes that Refining NZ, COLL, and other terminal operators will not be full members but will be included as required.

information and communication matters, even though they were identified as a high priority, with a target date of completion by 15 February 2018. The two specific tasks were to:

*Identify a data sharing protocol with key fuel companies. This is particularly important for the three companies involved in the RAP, Wiri and COLL arrangements, where there is the opportunity to easily get a high level picture of the entire sector.*

*Investigate whether the Commerce Commission can issue a framework that provides guidance and exemptions that apply during an emergency response.<sup>69</sup>*

- 12.16 We regard both these steps as necessary and urgent. MBIE told us that it consulted with fuel companies on this question in early 2018 and the results will be documented in the new Emergency Plan. Ensuring that a detailed and workable information-sharing protocol is in place should be a first task for the Fuel SCE. We would like to see it completed and tested before the end of this year.
- 12.17 We also think that MBIE should work with the sector, through the Fuel SCE, to settle the question of whether there is a competition law problem with the fuel companies giving it the type of information it would be seeking during an incident. The answer may depend, in part, on how widely that information would be shared with other companies; therefore, the way the information would be used should be part of the discussion. If a legal issue is found to create an impediment, then MBIE should coordinate the process for resolving it, using the mechanisms in the Commerce Act 1986 if necessary.
- 12.18 We acknowledge that, internationally, the fuel companies have developed extremely strong disciplines limiting the flow of information, both within and between the companies. They have done so for good reason – to avoid breaking competition laws. These disciplines govern the culture of these organisations when it comes to information. Their strength means that it is easy to lose sight of the situations in which it is lawful, appropriate, and important to share information. Any emergency protocols that enable information sharing should be discussed, practised, and refreshed regularly to ensure they are not forgotten.

### **Having effective contingency arrangements in place**

- 12.19 The previous chapter concluded that the sector did not have properly worked-through contingency arrangements ready to put into action if there was a significant outage in the supply chain. That needs to change.
- 12.20 Refining NZ has taken up this challenge and has developed a concept for a “mobile skid” that is effectively a portable pumping facility that could be moved to any location to unload fuel from a ship. Refining NZ has taken this proposal to the fuel companies and others in the sector to find out whether there is support for developing and implementing it. The Inquiry was told that there are technical and regulatory questions that must be worked through before any final decision can be made to support it. Refining NZ is willing to fund some of the skids and is looking for sector support to fund others.
- 12.21 We do not have a view on whether this proposal will be feasible. But we commend Refining NZ for taking the initiative and thinking creatively about ways to be better prepared. We encourage the other parties involved in this process to engage constructively with Refining NZ to work through the issues promptly.
- 12.22 Many other steps could be taken to be better prepared for another outage, including:
- ensuring there are adequate supplies of equipment that might be needed – for example, for converting trucks from one fuel to another;

<sup>69</sup> MBIE, *Refining NZ Pipeline Disruption Post Event Report* (3 November 2017), p 26.

- investigating whether it would be useful to introduce a capacity for Wiri to receive fuel from trucks as well as the RAP;
- working with NZDF to determine what equipment, transport, personnel, or other support they might be able to provide, as well as the steps that would be needed to make them compatible with the commercial supply chain systems;
- identifying the regulatory approvals that would be needed for any alternative supply routes or systems, and having the procedures and forms ready and worked through with the relevant authorities; and
- having traffic management plans and similar preparations ready to pick up and use.

12.23 While some of these solutions will be advanced by individual fuel companies or infrastructure operators, many of them will require a level of cooperation across the sector. Again, we see the Fuel SCE as having an important role in coordinating efforts to establish these arrangements in a timely way.

### **Do we need to build more infrastructure?**

12.24 The biggest issue that was highlighted by the 2017 outage was the inadequacy of the existing infrastructure to cope with an outage of any length. The situation raised questions about the amount of storage capacity in the system, how much fuel it can transport, and the existence of viable alternative supply routes. These questions are complex. We give them detailed consideration in the next Part of this report.

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## **Our recommendations**

The purpose of the following recommendations is to establish the building blocks of better planning and preparation for responding to a crisis in the fuel supply chain to Auckland.

We recommend:

### **Recommendation 8: Complete the new National Fuel Emergency Plan**

That MBIE and MCDEM complete their work on the new National Fuel Emergency Plan, which should include a specific section on jet fuel, and issue it by the end of 2019.

### **Recommendation 9: MBIE should actively lead the work to make the new Plan effective**

That MBIE has clear responsibility for providing proactive leadership in giving life to the new Plan, by convening regular meetings of the Fuel SCE, organising exercises to test the Plan, taking the lead in ensuring it is updated regularly, and coordinating and supporting the work programme needed to make the Plan effective.

### **Recommendation 10: The Fuel SCE should have a broader role**

That MBIE broaden the role of the Fuel SCE, drawing on the model provided by NOSEC in Australia.

### **Recommendation 11: The Fuel SCE should meet regularly**

That MBIE convene a meeting of the Fuel SCE within three months after the Plan has been issued, and broaden its role as a forum for building relationships, knowledge, and trust between the industry and government organisations. All potentially relevant industry parties should be included in the initial meetings.

**Recommendation 12: The Fuel SCE should oversee a project on information-sharing protocols**

That MBIE develops and tests the information-sharing protocols needed to support the new Plan, including clarifying any competition law issues. The Fuel SCE should oversee this work.

**Recommendation 13: The Fuel SCE should coordinate sector discussions on contingency planning and preparation**

That the Fuel SCE has a standing agenda item on contingency planning and preparation activities that require sector engagement (e.g., the assessment of the proposed mobile skid facility). In the short term, it should oversee a work programme on the preparation steps that emerged from the 2017 outage.

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## Part D: Ground fuels – infrastructure

### 13 How resilient is the supply system for ground fuels?

- 13.1 In this Part, we assess the resilience of the system for bringing ground fuels to Auckland. Most of the ground fuels for Auckland are received at, and distributed from, the storage tanks at Wiri. The three major fuel companies provided us with a copy of a recent report prepared by Hale & Twomey for WOSL, that assesses the resilience of the supply chain: *Auckland and Auckland Airport Product Supply Chain Resilience – 2019 update* (the “2019 WOSL Report”). This report contains a detailed assessment of the Wiri terminal’s capacity in relation to ground fuels.
- 13.2 The Inquiry also asked Fueltrac to assess the resilience of the ground fuels supply chain for Auckland. It did this by using two standards:
- diversity of supply routes; and
  - a comparison of the number of days of cover provided by storage in the supply chain (days’ cover) with the time it would take to bring in supplies from elsewhere (resupply time).
- 13.3 This chapter summarises the results of that analysis alongside the additional data we received from the fuel companies and others.

#### The different routes for bringing ground fuels to Auckland

- 13.4 The main supply chain is the one described in chapter 2: diesel and the various grades of petrol are refined at Marsden Point, sent down the RAP to Wiri, and then distributed to Auckland-based customers and retail service stations by truck. However, there are also several other possible routes for these fuels. They can be:
- loaded onto trucks at the truck-loading facility outside the refinery at Marsden Point, and then brought to Auckland and delivered by truck;
  - loaded onto a coastal ship at Marsden Point, shipped to a bulk-storage terminal at Mount Maunganui, and then brought to Auckland by truck;
  - imported as already-refined product to the bulk-storage terminal at Mount Maunganui and brought to Auckland by truck; or
  - trucked to Auckland from a bulk-storage terminal in New Plymouth.
- 13.5 Diesel can also be shipped to the storage tanks at Wynyard Wharf and then distributed around Auckland by truck. There are no petrol tanks at Wynyard Wharf.
- 13.6 Ground fuels are usually transported by truck around New Zealand. As a result, it is easier to create alternative supply routes for these when something goes wrong with the normal supply chain. Reasonable numbers of trucks and drivers are likely to be available to truck fuel on a new route.<sup>70</sup>
- 13.7 The 2017 RAP outage showed this to be the case for Auckland. The usual main supply chain could not operate, but because there were alternative ways to supply the Auckland region, there was no need to ration fuel during the 10-day outage.
- 13.8 Towards the end of the outage period, both Mobil and Z Energy ran out of premium-grade petrol for some of their Auckland service stations. There was no premium-grade petrol left at the Wiri terminal. If

<sup>70</sup> BP Response to Information Request, para 1.3.3.

## 13 How resilient is the supply system for ground fuels?

the outage had been longer, shortages in regular petrol and diesel would have been likely. We also note that if the Wiri terminal should become inoperable for a significant period, rationing of ground fuels within Auckland would be likely.

- 13.9 Fueltrac agreed that a number of independent storage terminals for ground fuels are available around the North Island and there are more than two ways of transporting petrol and diesel products. We agree with their assessment that there is good diversity of supply for ground fuels.

### The days of cover provided by the storage in the supply chain

- 13.10 The number of days of cover in any supply chain varies across the supply cycle, because storage levels will be high when tanks have just been refilled and low when they are just about to be refilled.<sup>71</sup> Fueltrac calculated that there is approximately 12 days' cover for normal consumption of diesel and petrol at the low point of the supply cycle, rising to 17 days' cover at the high point of the cycle.<sup>72</sup>
- 13.11 Fueltrac then set this figure against the time it would take to bring fuel in from somewhere else, to replenish supplies for the region. They assessed the best-case resupply time at 14 days, based on a scenario in which refined fuel that had been imported to Australia was redirected to Marsden Point wharf.<sup>73</sup>
- 13.12 These are not exact calculations as they involve several assumptions. However, the comparison gives a useful indication of how well the region would manage with existing stocks until new supplies could be brought in. Fueltrac calculated that days' cover for ground fuels at the low point of the supply cycle falls two days short of the best-case resupply time. However, the disruption risk is reduced because there is a second supply chain that imports fuel directly into Tauranga and can be scaled up if needed.
- 13.13 Based on this analysis, Fueltrac was satisfied with the resilience of the ground fuels supply chain for Auckland for petrol of all grades. They noted that resilience would be reduced for diesel following the removal of the tanks at Wynyard Wharf. We discuss this further in paragraph 13.22.

### Petrol storage at Wiri

- 13.14 Hale & Twomey identified that, despite a small growth in national demand for petrol over the past three years (+3%), there has been a decline in petrol throughput at the Wiri terminal (-13%).<sup>74</sup> They cited three reasons for this change:<sup>75</sup>
- In 2016 and 2017, the RAP reached capacity following sharp jet fuel growth, resulting in a shift of petrol products to other terminals.

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<sup>71</sup> Low points can occur for several reasons: for example, coastal tankers may have just been loaded to take supplies to other ports; international shipping may be delayed because of weather or berth congestion; there may be a short-term refinery outage; or a tank may be out of service. In general, these situations are anticipated and managed as part of ordinary activity.

<sup>72</sup> Fueltrac's assessment excluded the diesel storage at Wynyard Wharf, given that these tanks are to be decommissioned in the near future.

<sup>73</sup> Resupply time is estimated using the assumptions of a flexible international supply chain; a buyer prepared to pay a premium to secure an option; an exchange; and a supply diversion or another trading option to facilitate prompt deliveries of liquid fuels. Fueltrac, *Options to achieve better resilience and security of fuel supply for Auckland, in particular for jet fuel* (June 2019), p 24.

<sup>74</sup> Hale & Twomey, *Auckland and Auckland Airport Product Supply Chain Resilience – 2019 update* (May 2019), (the 2019 WOSL Report), p 9.

<sup>75</sup> 2019 WOSL report, p 9.

### 13 How resilient is the supply system for ground fuels?

- The 2017 RAP outage resulted in a need to shift substantial petrol demand to other terminals, some of which did not shift back to the Wiri terminal.
- The Auckland regional fuel tax, which was implemented in July 2018, has reduced throughput at the Wiri terminal.

13.15 Despite the small growth in petrol demand nationally, Refining NZ and the fuel suppliers told the Inquiry that they expected petrol demand to be reasonably flat across the coming decade, especially in light of the New Zealand Government's intention to become carbon neutral by 2050.

13.16 As a result, the storage at Wiri terminal is likely to be sufficient to manage demand for petrol through to at least 2030. There is also storage available at other points in the supply chain, including Marsden Point and Mount Maunganui.

#### Storage capacity for diesel

##### Wiri

13.17 The picture is different in relation to diesel. Nationally, the demand for diesel has been growing at an average rate of about 13% over the past three years. The demand at Wiri over this period has increased at the lower rate of 7%.<sup>76</sup>

13.18 Figure 9 shows the forecast diesel demand at Wiri through to 2040, based on low, mid and high case forecasts. The Inquiry focused on the forecasts through to 2030. These show that the throughput demand for diesel is expected to keep increasing through to 2030 on the mid and high forecasts.

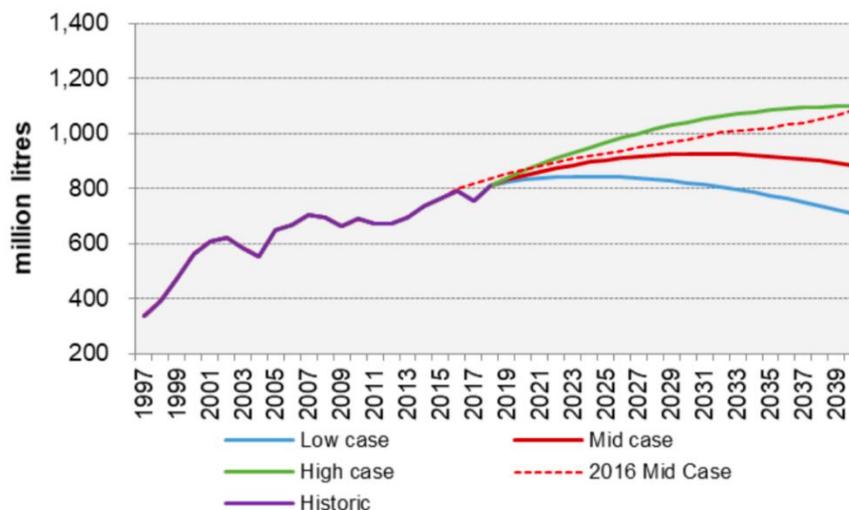


Figure 9: Forecasted diesel demand scenarios at Wiri to 2040<sup>77</sup>

13.19 If demand increases and storage stays the same, the number of days' cover the storage facility can provide for that fuel will gradually decrease. Figure 10 shows the reduction in days' cover for diesel at the Wiri terminal:

- Cover drops from seven days in the mid-2000s to about five days in 2019.

<sup>76</sup> 2019 WOSL Report, p 11.

<sup>77</sup> 2019 WOSL Report, p 12.

### 13 How resilient is the supply system for ground fuels?

- On the mid forecast, cover drops to four days by 2030.
- On the high forecast, cover drops to close to three days by 2030.

13.20 Hale & Twomey also noted that days' cover was currently dropping to close to three days just before a new batch of diesel is delivered down the RAP, and was expected to fall below that level in the near future. They regarded stocks below the three-day level as a concern from a resilience perspective.<sup>78</sup> We note that the two sharp drops shown in Figure 11 are periods when a diesel tank will be offline for necessary 10-year maintenance.

13.21 However, the picture is complicated by the likelihood that ground fuels will gradually be displaced from the RAP so that it can transport more jet fuel. If that happens, ground fuels will be brought in through other routes, so the Wiri storage may become less important.

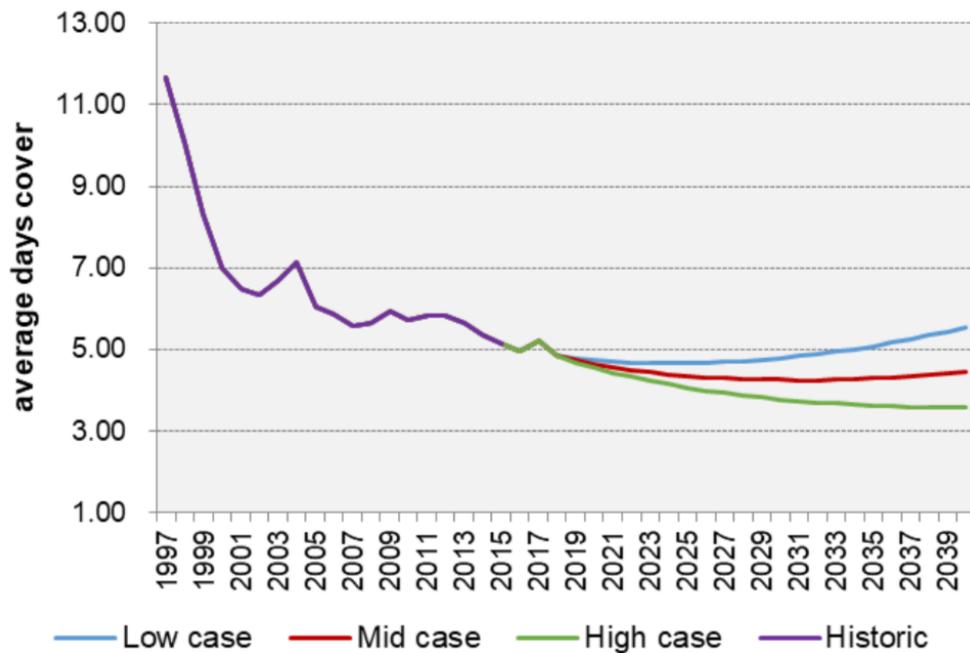


Figure 10: Diesel days' cover at Wiri through to 2040<sup>79</sup>

<sup>78</sup> 2019 WOSL Report, p 16.

<sup>79</sup> 2019 WOSL Report, p 16.

## 13 How resilient is the supply system for ground fuels?

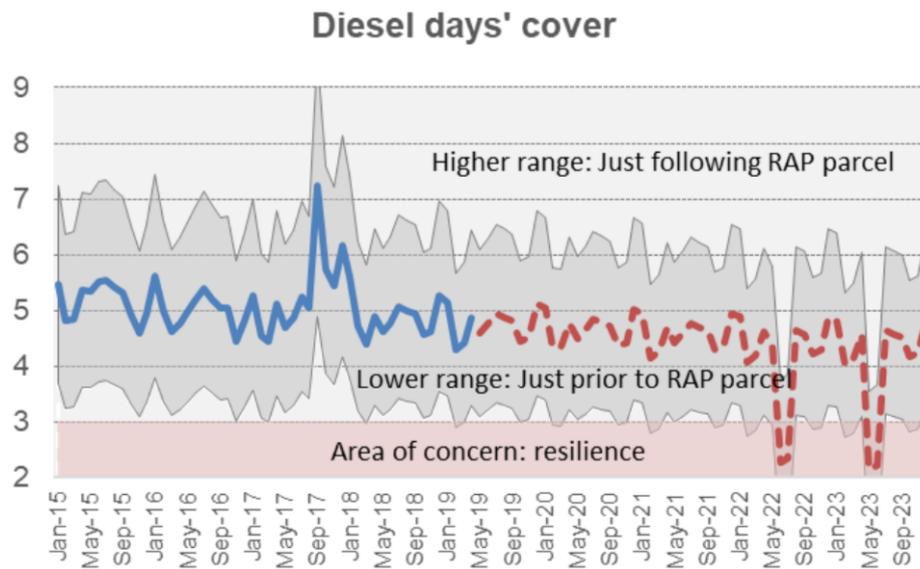


Figure 11: Diesel days' cover at Wiri in the medium term<sup>80</sup>

### Wynyard Wharf

13.22 Wynyard Wharf currently has two tanks, with capacity to store 13 million litres of diesel in total. However, these tanks are due to be decommissioned and removed from 2020. Several participants identified that the removal of these tanks will create a resilience issue in relation to diesel. BP stressed that the Wynyard Wharf tanks were very helpful in managing supply during the RAP outage. Stolthaven Terminals, which operates the Wynyard Wharf facility, told us that during the outage:

- Stolthaven immediately increased diesel distribution and extended operating hours to 24 hours, seven days a week;
- Wynyard Wharf received 17 million litres of diesel from two ships;
- Wynyard Wharf distributed 12 million litres of diesel product over September and October 2017, (involving 820 truck movements); and
- diesel capacity at Wynyard Wharf continued to support Wiri for several months after the pipeline outage, because it took some time for the storage at Wiri to return to normal levels while the RAP was run at lower pressure.

13.23 To make up for the loss of 13 million litres of diesel storage at Wynyard Wharf, Fueltrac concluded that investment in additional diesel tank storage in other parts of the supply chain is required.

13.24 In our view, the combination of the loss of storage capacity at Wynyard Wharf and the reduced cover that is expected at Wiri means the system for supplying diesel is losing resilience. Further investment in storage may be needed soon, but the amount and location will depend on the way the supply chains develop over the next few years. Given the lead time for making decisions and building storage tanks, we consider that the fuel companies need to monitor the situation closely so they can make decisions in a timely way.

<sup>80</sup> 2019 WOSL Report, p 16.

## 13 How resilient is the supply system for ground fuels?

### Our findings on the supply system for ground fuels

- 13.25 We have concluded that the systems for supplying the Auckland region with petrol of all grades are sufficiently resilient now and through to 2030, because:
- there are several permanent routes or supply chains for bringing petrol into Auckland, which can be scaled up as needed if there is a problem with the main supply route; and
  - the main storage facility at Wiri has sufficient storage capacity to manage the expected demand for petrol.
- 13.26 The 2017 outage proved the resilience of the supply systems for petrol. The only shortage was that a small number of retail outlets ran out of higher-grade petrol in the last few days of the outage.
- 13.27 The system for supplying diesel has the same diversity of supply chain options, which is a strength. However, the demand for diesel is projected to increase through to 2030 and the storage capacity at Wynyard Wharf will be lost from 2020. The capacity to manage at the Wiri terminal is forecast to decline, with days' cover projected to drop to below three days at the low point of the supply cycle more often.
- 13.28 These forecasts show that the level of resilience for diesel is decreasing. In our view, this decreasing resilience for diesel needs to be monitored closely to ensure the decisions regarding the required investment in additional storage can be made in a timely way. The location and size of any new storage will depend on the use of the different supply routes.

#### Summary of our findings

- There are multiple supply chains for bringing ground fuels to the Auckland region, which is a strength from a resilience perspective.
- For petrol, there is sufficient storage in the system to manage demand. The system for supplying petrol of all grades to Auckland is sufficiently resilient, now and through to 2030.
- For diesel, the amount of cover provided by storage at the Wiri terminal is forecast to reduce as demand increases through to 2030. The latest forecasts show cover falling below three days more often at the low point of the supply cycle.
- The removal of the diesel storage tanks at Wynyard Wharf will further reduce the resilience of the diesel supply system.
- Additional storage tanks for diesel may need to be built soon to avoid having the resilience of the diesel supply fall to an inadequate level. The location and size of any new tanks will depend on the use of the different supply routes.
- The fuel companies need to monitor the situation closely to ensure decisions on investment in new infrastructure are made in a timely way.

### 13 How resilient is the supply system for ground fuels?

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#### **Our recommendation on ground fuels**

##### **Recommendation 14: Auckland needs additional storage tanks for diesel**

We recommend that the fuel companies:

- closely monitor the resilience of the arrangements for supplying diesel to Auckland; and
  - give early consideration to the investment in new storage tanks that will be needed to maintain an appropriate level of resilience, while recognising the multiple supply chain routes to the Auckland region.
-



## Part E: Jet fuel – infrastructure

### 14 The capacity of the jet fuel supply infrastructure

14.1 This Part assesses the resilience of the system for supplying jet fuel to Auckland Airport:

- This chapter describes the capacity of the infrastructure making up the current supply chain and sets it against the historical and projected future demands for jet fuel.
- Chapter 15 assesses that capacity from a resilience perspective, using the standards provided by Fueltrac.
- Chapter 16 examines the reasons for the declining resilience of this supply chain and whether that could be reversed by new investment.
- Chapter 17 discusses possible alternative routes or supply chains for bringing jet fuel to Auckland.
- Drawing on the findings from these four chapters, chapter 18 summarises our analysis of the issues and our conclusions, along with our recommendations.

#### How we assessed the capacity of the jet fuel supply chain

14.2 The 2017 RAP outage highlighted that the supply chain that brings jet fuel to Auckland Airport is vulnerable to what is known as “single-point failure risk” at all points. That is, if the infrastructure at a particular point fails, there is no ready alternative that can keep the overall supply chain operating. As set out in detail in chapter 2, the supply chain involves the following process:

- The Marsden Point refinery refines jet fuel from imported crude oil.
- Once certified at Marsden Point, the jet fuel is sent to Wiri along the RAP.
- At Wiri, the jet fuel must settle for quality purposes, then it is re-certified and sent to the JUHI at Auckland Airport along the WAP (or in some circumstances, it is trucked to the JUHI).
- At the JUHI, the jet fuel must again be left to settle for quality purposes, then it is re-certified and pumped to the gate on the apron through the airport’s hydrant system.
- Finally, the fuel is pumped from the hydrant into the fuel tanks of the aeroplanes.

14.3 There are two key concepts for assessing the capacity of a supply chain like this: storage capacity provided by the tanks at each point (the refinery, Wiri, and the JUHI); and the throughput capacity or volume that can be moved through the two pipelines.

14.4 The storage of jet fuel stocks at points along the supply chain is important for resilience because it provides cover against surges in demand and supply interruptions, as well as a level of redundancy in case the infrastructure fails. All airports have some storage capacity or redundancy built into their supply chains, and there is international guidance to help work out the appropriate amount of protection.<sup>81</sup>

14.5 Along the Auckland jet fuel supply chain, fuel stocks are stored at the Marsden Point refinery, Wiri, and the JUHI at Auckland Airport. As the 2017 outage showed, these stocks can help the airport to keep operating while damage to the supply chain is repaired and while a temporary supply chain is established. They also help the airport manage stresses, such as surges in demand during peak travel periods, such as school holidays.

<sup>81</sup> The International Air Transport Association (IATA) has published guidance material on airport fuel storage capacity: *IATA Guidance on Airport Fuel Storage Capacity* (First Edition, May 2008), pp 1, 3, and 4.

## 14 The capacity of the jet fuel supply infrastructure

- 14.6 It is widely agreed in the industry that storing fuel as close as possible to the airport is the most important step for protecting against disruption, because no further transport is needed to bring the fuel to where it is used if the disruption occurs upstream in the supply chain.
- 14.7 Redundancy is also important in relation to pipelines like the RAP and WAP. For pipelines, redundancy is assessed in terms of throughput capacity, rather than storage. The pipelines need to have a certain amount of spare throughput capacity (measured against demand), which means that more fuel than usual can be sent down them if that is needed to cope with disruptions or surges in demand.<sup>82</sup>

### The overall capacity across the supply chain

- 14.8 The Inquiry asked the relevant participants for detailed information on the capacity of the different parts of the supply chain. We then asked Fueltrac to assess that information. They calculated the days of cover provided by storage in the whole supply chain, using the figure of the average daily demand for jet fuel at Auckland Airport.
- 14.9 Their conclusion was that, in terms of days' cover, there appeared to be approximately 10–14 days of jet fuel in storage at different stages of the supply cycle (with 10 days' cover at the low point of the supply cycle).<sup>83</sup>

### Forecast demand for jet fuel

- 14.10 The forecasts of expected demand are important for assessing resilience. They indicate what the system will have to cope with in the future. If demand is likely to increase, that is a stress the system will have to manage.
- 14.11 The Inquiry asked all relevant participants for their views on the future demand for jet fuel at Auckland Airport. As a result, we were provided with a report that had been commissioned by Auckland Airport and BARNZ in 2018. The report – *Jet Fuel System Resilience and Capacity Review* (the “2018 Capacity Review”) – was prepared by Hale & Twomey and WorleyParsons to provide a forward-looking view of the resilience and capacity of the Auckland Airport jet fuel supply chain.<sup>84</sup>
- 14.12 This report set out the forecast that is reproduced in Figure 12 (the “Jet Fuel Demand Forecast”). It shows jet fuel demand at Auckland Airport since 1990, as well as forecast growth on a high, base (mid) and low forecast from 2018 through to 2044.

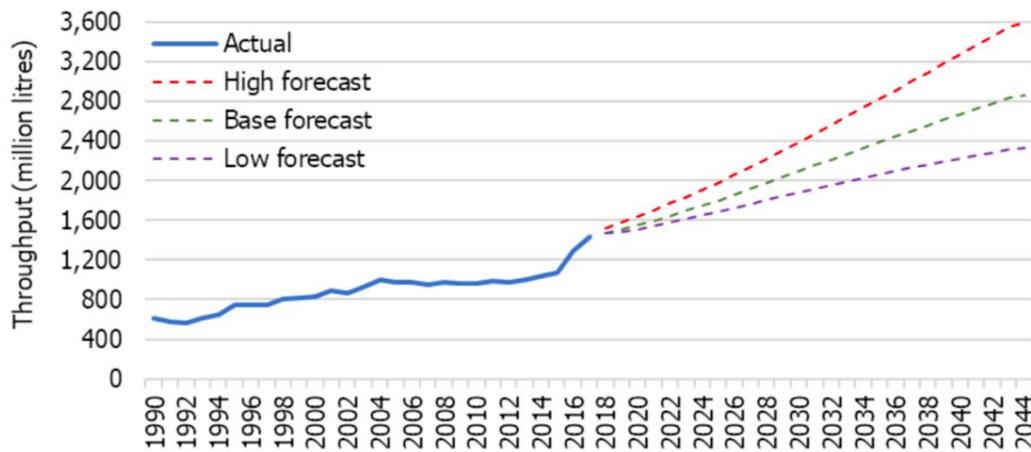
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<sup>82</sup> Fueltrac, *Options to achieve better resilience and security of fuel supply for Auckland, in particular for jet fuel* (June 2019) (Fueltrac report), p 26.

<sup>83</sup> Fueltrac report, p 25.

<sup>84</sup> The demand forecast uses historical jet fuel demand data (for calibration) and forward-looking passenger forecasts prepared by DKMA for Auckland Airport: Hale & Twomey and WorleyParsons, *Jet Fuel System Resilience and Capacity Review* (June 2018), p. 7. The forecast was used again in the 2019 WOSL Report, p 7.

## 14 The capacity of the jet fuel supply infrastructure



Source: Fuel System Feasibility Study Masterplan Report Forecast

**Figure 12: Jet fuel demand forecast at Auckland Airport to 2044<sup>85</sup>**

14.13 The data shows that the demand for jet fuel at Auckland Airport has doubled over the last 20 years. Half of that growth was in the last four years.<sup>86</sup> The main drivers of the recent high growth rates have been:<sup>87</sup>

- an increase in international passenger numbers (75–80% of New Zealand’s jet fuel demand is used for international flights);
- an increase in long- and ultra-long-haul flights, which require substantially more fuel than shorter flights, such as Trans-Tasman routes; and
- fuel prices – when fuel prices are lower, new or long-haul routes are more viable than when prices are high.

14.14 The Jet Fuel Demand Forecast assumed:<sup>88</sup>

- the main driver of jet fuel demand will continue to be an increase in the number of passengers;
- there will be “a continued increase in demand from a gradual move towards longer haul flights”; and
- the “high forecast likely reflects a more optimistic outlook for passenger growth and a larger impact from longer haul flights”.

14.15 On 30 May 2019, the Inquiry held a closed workshop with key participants.<sup>89</sup> During the workshop, most participants agreed that:

- the Jet Fuel Demand Forecast is the best available forecast of the likely future jet fuel demand at Auckland Airport;
- the high to base (mid) forecasts were the best forecasts to rely on; and

<sup>85</sup> This graph is taken from Hale & Twomey and WorleyParsons, *Jet Fuel System Resilience and Capacity Review* (June 2018).

<sup>86</sup> Submission of Refining NZ (27 May 2019), para. 78; Hale & Twomey and Worley Parsons, *Jet Fuel System Resilience and Capacity Review* (June 2018), p. 28.

<sup>87</sup> 2019 WOSL Report, pp 4–5.

<sup>88</sup> 2019 WOSL Report, p 7.

<sup>89</sup> The attendees were Air New Zealand, Auckland Airport, BARNZ, BP, Gull, MBIE, Mobil, Qantas, Refining NZ, WOSL, and Z Energy.

## 14 The capacity of the jet fuel supply infrastructure

- growth in demand for jet fuel at Auckland Airport was somewhere between 3.5 and 4% a year (which sits above the base forecast).

14.16 The specific data points for the Jet Fuel Demand Forecast through to 2040 are set out in Table 9.

**Table 9: Updated forecast jet fuel demand for selected years to 2040<sup>90</sup>**

2019 update to JUHI forecasted jet demand to 2040 (million litres)						
Case	2018	2020	2025	2030	2035	2040
Low case	1,503	1,509	1,685	1,883	2,065	2,224
Mid case		1,550	1,802	2,094	2,387	2,668
High case		1,642	1,982	2,391	2,826	3,271

14.17 We acknowledge that forecasting is an imperfect science and that forecasts will change over time. However, we consider growth in the range of 3.5–4% a year to be a realistic assessment of the likely future demand (which is between the base (mid) and high forecasts). Given the way that demand is tracking, it is prudent to use this range when thinking and planning for resilience purposes. If demand increases in accordance with this range, Table 9 indicates that:

- by 2030, Auckland Airport will require somewhere between 600 and 900 million litres of additional jet fuel each year; and
- by 2040, Auckland Airport will require somewhere between 1.2 and 1.8 billion litres of additional jet fuel each year.

14.18 We now turn to assessing how well the infrastructure in the supply chain will cope with this increasing demand. Figure 13 illustrates the capacity of the existing system along with the forecast increases in demand.<sup>91</sup>

### Storage capacity

#### *Storage at Wiri*

14.19 In the 2019 WOSL Report, Hale & Twomey modelled the impact that the Jet Fuel Demand Forecast would have on days of storage cover at Wiri. Figure 14 shows the average days' cover provided by Wiri from 1997 to 2019, as well as the forecast days' cover out to 2040 based on the high, base (mid) and low forecasts. This graph assumes no further investment in infrastructure at Wiri.

<sup>90</sup> This is Table 2 of 2019 WOSL Report, p 8.

<sup>91</sup> The forecast demand figures in this figure are based on the Hale & Twomey high-case scenario because those figures most closely fitted with the forecast range the Inquiry chose to work with. The forecast demand figures are calculated on the average day in the peak month.

## 14 The capacity of the jet fuel supply infrastructure

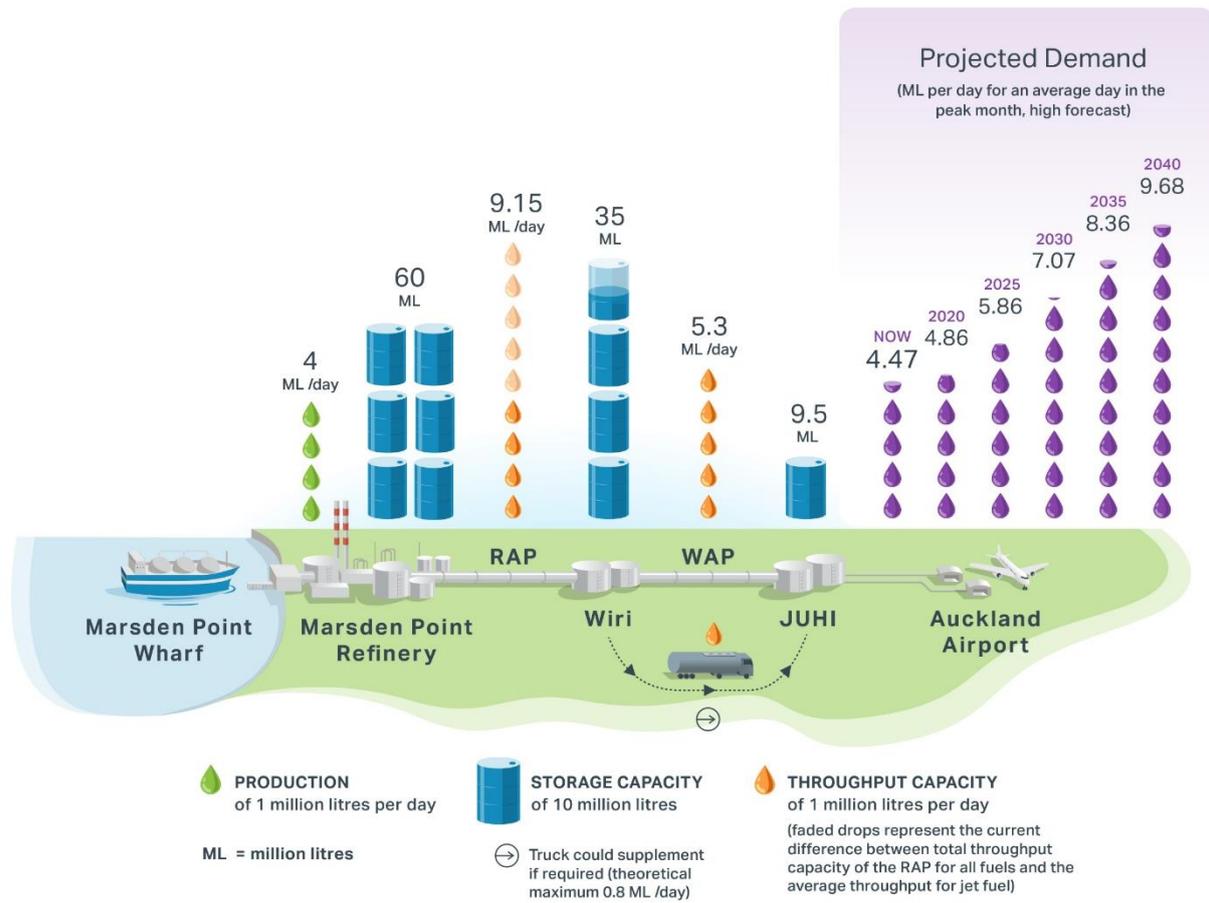


Figure 13: Capacity of jet fuel infrastructure and forecast demand

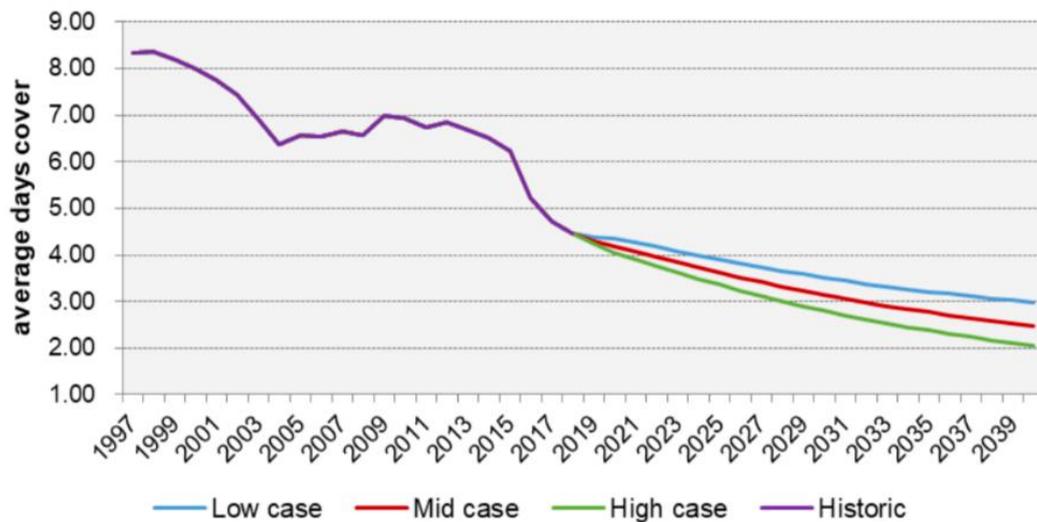


Figure 14: Average jet fuel days' cover forecast at Wiri to 2040<sup>92</sup>

<sup>92</sup> 2019 WOSL Report, p 14.

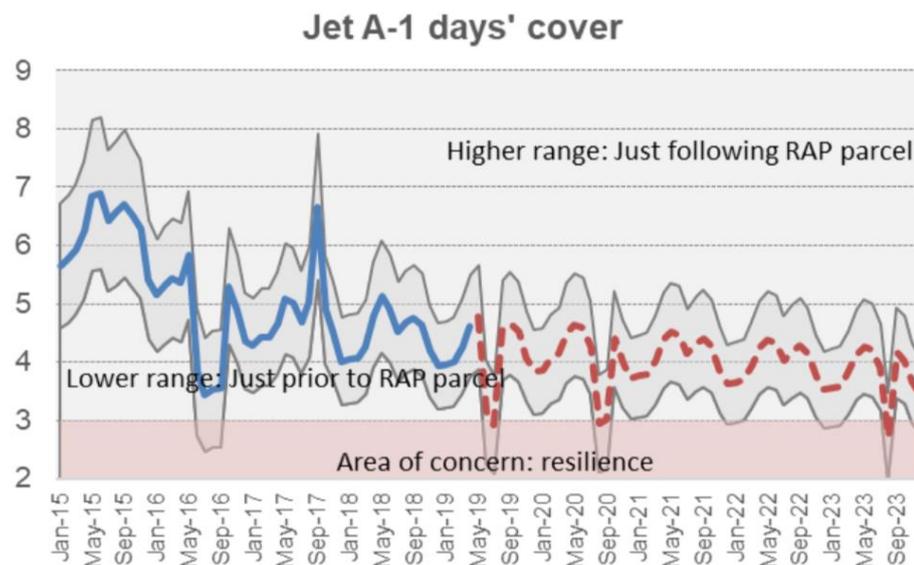
## 14 The capacity of the jet fuel supply infrastructure

14.20 The graph shows there has been no increase in the storage capacity at Wiri since the mid-1990s.

Over time, the days' cover at Wiri has been reducing. It is now approximately half of what it was in the mid-1990s.<sup>93</sup>

14.21 Figure 14 shows a particularly sharp drop in the amount of cover in the last four years. Cover levels are now significantly lower than at any other time in the past, averaging a little over four days. Average cover in 2019 is expected to be around 60% of the level it was in 2014.

14.22 Figure 15 goes into more detail. It shows that in peak demand months, the cover at Wiri just before the delivery of a batch of jet fuel from the RAP is only slightly above three days. This low point is set to fall below three days by 2022. The graph also shows the impact of routine tank maintenance proposed for 2019, 2020, and 2023, with sharp drops in cover coinciding with a jet fuel tank being out for maintenance for an 8-week period.



**Figure 15: Average jet fuel days' cover forecast at Wiri in the medium term<sup>94</sup>**

14.23 Hale & Twomey also noted that the jet fuel system needs a certain amount of stock to operate (in that the amount of stock cannot be reduced to zero without causing a disruption to the subsequent jet fuel supply). When the buffer stock is removed from the calculation, the amount of cover is even lower than that indicated by the lower range in Figure 15.<sup>95</sup>

### **Storage at the JUHI**

14.24 The 2018 Capacity Review set out the average days' cover at the JUHI from 1990 to 2018, and then modelled the estimated cover out to 2044 based on the base (mid) forecast (see Figure 16). Again, the modelling assumed no further investment in infrastructure.

<sup>93</sup> Hale & Twomey and WorleyParsons, *Jet Fuel System Resilience and Capacity Review* (June 2018), p. 29.

<sup>94</sup> 2019 WOSL Report, p 14.

<sup>95</sup> 2019 WOSL Report, p 14.

## 14 The capacity of the jet fuel supply infrastructure

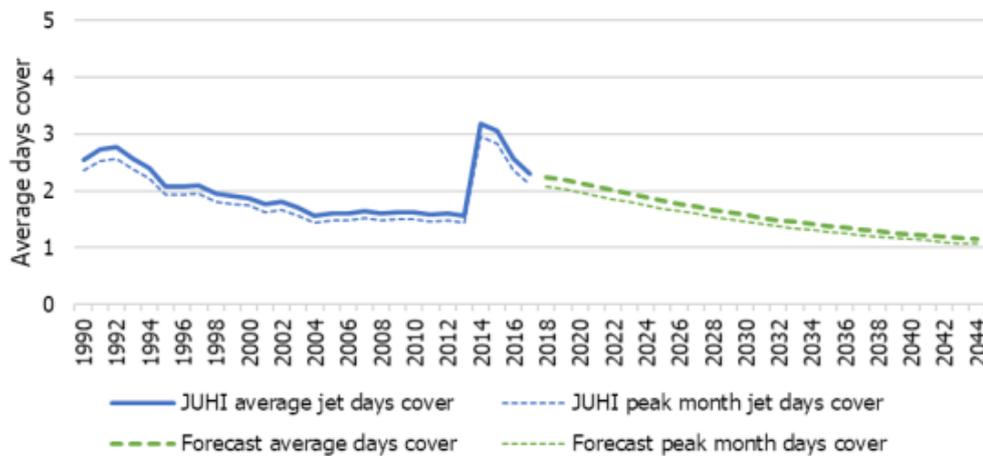


Figure 16: Average jet fuel days' cover forecast at JUHI to 2044<sup>96</sup>

14.25 The graph shows a steep increase in the average jet fuel days' cover in 2013, which coincided with the installation of two new tanks at the JUHI. These two tanks were expected to provide sufficient additional capacity for some time. However, the unexpected increase in jet fuel demand over the past four years means that instead, there has been a sharp reduction in the amount of cover.<sup>97</sup>

14.26 There is currently around two days' cover at the JUHI. Cover is less than two days during peak demand months.<sup>98</sup> Figure 17 shows that the number of months in which storage cover falls below two days is expected to increase during the next two years.

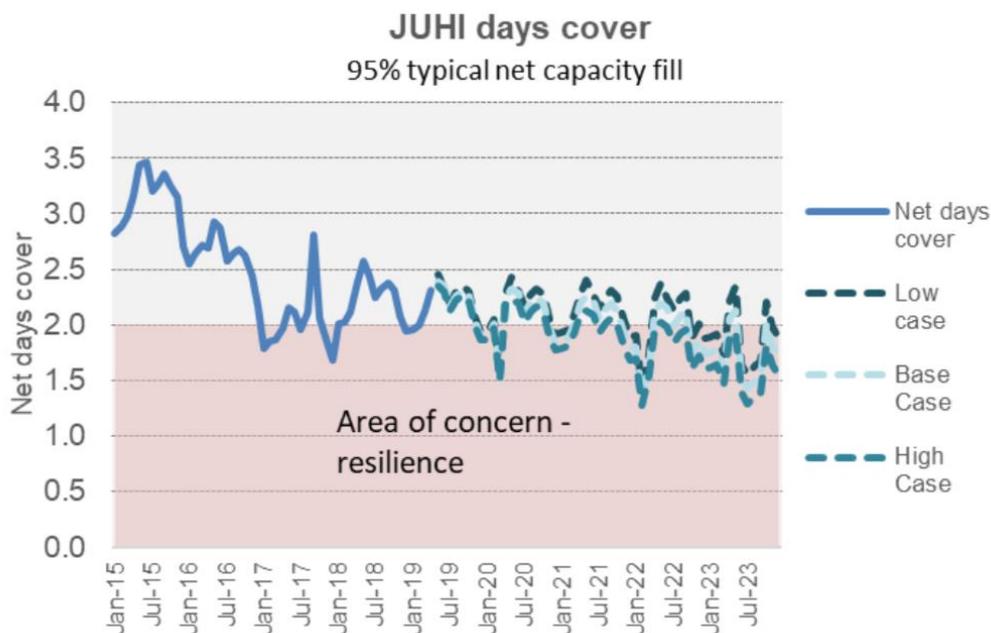


Figure 17: Forecast reduction in days' cover at the JUHI to July 2023<sup>99</sup>

14.27 In 2023, the two large tanks at the JUHI are scheduled to be taken out of service for their 10-year inspection. As with Wiri, there will be a significant reduction in the level of days' cover at the JUHI

<sup>96</sup> Hale & Twomey and WorleyParsons, *Jet Fuel System Resilience and Capacity Review* (June 2018), p. 9.

<sup>97</sup> See Hale & Twomey and WorleyParsons, *Jet Fuel System Resilience and Capacity Review* (June 2018), p. 20.

<sup>98</sup> 2019 WOSL Report, p 18.

<sup>99</sup> This figure is taken from 2019 WOSL Report, p 18.

## 14 The capacity of the jet fuel supply infrastructure

while these tanks are out of service. For that period, the three fuel companies will need to rely more on the storage at Wiri, which we have already found is limited.<sup>100</sup>

### Throughput capacity in the two pipelines

#### *Throughput capacity of the RAP*

- 14.28 The RAP currently delivers approximately 126 million litres of jet fuel to Wiri in a typical month.
- 14.29 As we noted in chapter 2, Refining NZ is scheduled to start testing the use of a drag-reducing agent in the RAP later this year. The drag-reducing agent cannot be added to jet fuel, but it will increase the throughput of petrol and diesel being sent down the pipeline, meaning that time will be freed up for more deliveries of jet fuel. The expected gain is about 15% more capacity.
- 14.30 Refining NZ also told us that it is in the process of seeking the consent of Lloyd's Register (the external certifier) to increase the RAP's maximum operating pressure from 75 barg to 82 barg. It expects that a Certificate of Fitness for the pressure increase will be issued later this year, ahead of the 2019 peak demand period.<sup>101</sup>
- 14.31 In May 2019, Refining NZ modelled the capacity of the RAP against the Jet Fuel Demand Forecast. Their results showed that using a drag-reducing agent with petrol and diesel fuels from 2020 would result in the following changes:<sup>102</sup>
- In the likely growth scenario, the pipeline's existing capacity would be sufficient to meet expected demand through until 2035, and then its capacity would be constrained only in the peak month (December). Refining NZ told the Inquiry this constraint could be managed by drawing down Wiri's stock during December (taking advantage of spare pumping capacity in November and January).<sup>103</sup> With this step, Refining NZ believed that the RAP capacity would be sufficient to meet jet fuel demand through until 2045.
  - In the high-growth scenario, the RAP would start to become constrained in the peak demand months of December and February from 2029 onwards. Refining NZ said at this point, it would be able to meet jet fuel demand by reducing Waikato-bound petrol and diesel volumes that passed through the RAP to Wiri and instead, sending that fuel by coastal tanker to Mount Maunganui. If this occurred, Refining NZ said the modelling indicated the RAP's capacity would be sufficient to meet jet fuel demand through to 2045.
- 14.32 One of Refining NZ's customers told the Inquiry that, in its opinion, it was unlikely that Refining NZ's existing infrastructure would be able to keep pace with future demand growth for both jet fuel and ground fuels in Auckland. The customer also said it was planning to divert ground fuels from the RAP in the final quarter of 2019 and the first quarter of 2020 and instead, would deliver them via the Marsden Point truck-loading facility or Mount Maunganui.
- 14.33 We put this comment to Refining NZ. It advised us that the RAP currently has surplus capacity to supply ground fuels and jet fuel into Auckland, which is allowing the RAP to be used for the supply of fuel south of Auckland into the Waikato. To the extent that any adjustments to supply are needed to cover the peak demand months of December 2019 and February 2020 (should the RAP not be

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<sup>100</sup> 2019 WOSL Report, p 18.

<sup>101</sup> Refining NZ's response to the Inquiry's information request of 2 August 2019, p 2.

<sup>102</sup> Refining NZ, *Anticipated demand for jet fuel* (10 May 2019). Refining NZ noted that these projections were based on modelling in May 2019. As with any projections, they would be subject to regular review and updating.

<sup>103</sup> The Inquiry notes that this step could reduce the resilience of the system, depending on the amount of storage capacity in the supply chain at the time.

## 14 The capacity of the jet fuel supply infrastructure

operating at 82 barg), Refining NZ said these will simply result in a shift in the supply of ground fuels into the Waikato (via Mount Maunganui).<sup>104</sup>

### Throughput capacity of the WAP

14.34 The Inquiry understood that the WAP can currently achieve a maximum throughput capacity of approximately 5.3 million litres per day.

14.35 In its May 2019 report prepared for WOSL, Hale & Twomey observed, in relation to the WAP:

*Even with two pump operation in peak months (December/January) pumping is now required 20 hours a day, taking it close to maximum capacity. Within five years on the mid forecast, this will rise to a 22 hour[s] per day.<sup>105</sup>*

14.36 These capacity issues are illustrated in Figure 18.

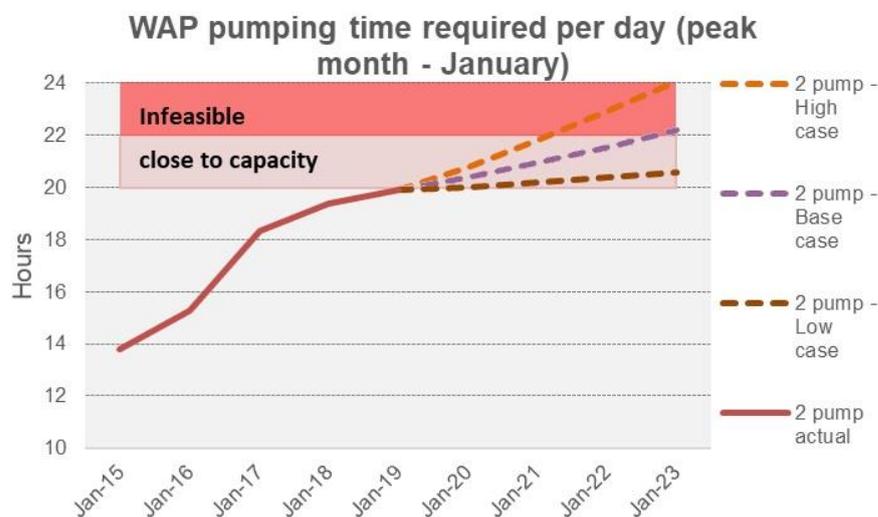


Figure 18: WAP pumping time required per day over the peak month of January<sup>106</sup>

14.37 Figure 18 also shows that if demand follows the high forecast, pumping will be required for 22 hours per day in peak months as early as January 2021, and pumping will reach maximum capacity (i.e., 24 hours per day) by January 2023. We understand that pumping 24 hours per day is not feasible because the pumps need to be turned off for ordinary maintenance activity.

14.38 Jet fuel can be trucked from Wiri to the JUHI if the WAP is unable to meet demand. An exercise was conducted in September 2018 to assess how much fuel could be moved by truck over a 23-hour period. In that trial, 0.8 million litres of jet fuel was delivered to the JUHI through 24 trips, using four trucks and eight drivers.<sup>107</sup> We understand this to be about 18% of January 2019 peak month demand.<sup>108</sup>

14.39 However, this figure should not be taken as a realistic indication of the amount that could be trucked in practice. Not only would it require modifications to the JUHI to improve receipt capacity but it would also create traffic management problems at Auckland Airport. Auckland Airport told the Inquiry that it does not consider trucking to the JUHI to be viable at the moment, other than on an exceptional basis.

<sup>104</sup> Refining NZ's response to the Inquiry's information request of 2 August 2019, p. 1.

<sup>105</sup> 2019 WOSL Report, p. 17.

<sup>106</sup> 2019 WOSL Report, p. 17.

<sup>107</sup> 2019 WOSL Report, p. 17.

<sup>108</sup> 2019 WOSL Report, p. 17, footnote 5.

## 14 The capacity of the jet fuel supply infrastructure

They said this was because the core precinct's domestic access roads have to be completely closed twice for each truck delivery and this has a significant impact on the operations of the domestic terminal.<sup>109</sup>

14.40 Z Energy provided the Inquiry with analysis that, based on annual growth of 3.5% a year to 2035, and with no further investment in infrastructure to increase throughput capacity:<sup>110</sup>

- there will be insufficient WAP capacity to meet December 2019 demands, and the shortfall will have to be trucked to the airport;
- more trucking from Wiri to the JUHI, or additional WAP capacity, will be needed as early as February 2023 to prevent JUHI stocks from being negatively affected – in other words, JUHI tanks will not be able to be kept full, which will reduce the cover they provide; and
- peak days will not be manageable after 2024 using the WAP supplemented by trucks.

14.41 If Z Energy's analysis is correct, an infeasible volume of fuel would need to be transported by truck to the JUHI at Auckland Airport. This is unlikely to be practical or acceptable to Auckland Airport.

### Our findings on the current capacity

14.42 We find that the best information on forecasts of demand for jet fuel at Auckland Airport is contained in the 2018 Capacity Review. The Jet Fuel Demand Forecast in that report showed that demand has increased rapidly over the last four years and is currently tracking above the base case and closer to the high-case forecast, with average growth of around 3.5 to 4% each year.

14.43 The Inquiry has concluded that forecast growth in the range of 3.5–4% is a realistic assessment of the likely future demand and is a prudent forecast to work with when assessing the resilience of the fuel supply chain. On this forecast, Auckland Airport will need somewhere between 600 and 900 million litres of additional jet fuel by 2030, and between 1.2 and 1.8 billion litres of additional jet fuel by 2040.

14.44 When the amount of storage is set against average demand, the whole of the supply chain (the total of the tanks at the refinery, Wiri, and the JUHI) currently has between 10 and 14 days of jet fuel in storage, depending on the stage of the supply cycle.

14.45 We have concluded that the capacity of three parts of the supply chain has not been able to keep pace with demand:

- At Wiri, days' cover has been reducing and now averages a little over four days – about 60% of the level in 2014. Before a batch of jet fuel arrives, it is just above three days and it is forecast to fall below three days by 2022.
- At the JUHI, the two new tanks installed in 2013 have not been enough to maintain capacity in the face of the increasing demand. Cover is now around two days in an average month, under two days during peak months, and projected to drop further.
- On the WAP, Hale & Twomey's analysis suggests that it will not be feasible to pump enough jet fuel to meet daily demand in the peak month of January – by 2021 on the high case of the Jet Fuel Demand Forecast, and by 2023 on the mid case. This is supported by Z Energy's analysis.

14.46 In addition, the storage capacity for jet fuel at Wiri and the JUHI will be reduced for essential tank maintenance that is scheduled at various times over the next four years.

<sup>109</sup> Auckland Airport submission in response to draft Fueltrac report, subsequent workshop (30 May) and forum sessions (11 June 2019), para. 30.

<sup>110</sup> Z Energy Response to Information Request (12 April 2019), p 13.

## 14 The capacity of the jet fuel supply infrastructure

14.47 In theory, it might be possible to supplement the WAP's capacity by trucking up to 0.8 million litres of fuel a day to the JUHI. However, in our view this is unlikely to be a plausible option at the moment for maintaining normal supply, other than for modest amounts in peak months. We accept that Auckland Airport would find it unacceptably disruptive to its operations for large numbers of trucks to be travelling to and from the JUHI, other than in exceptional circumstances.

14.48 The other main part of the supply chain is the RAP. The Inquiry finds that Refining NZ has a clear picture of the forecast increase in jet fuel demand at Auckland Airport and has series of projects underway that are focused on ensuring the RAP can meet the forecast increase in demand. If its planned improvements to the RAP's capacity are implemented (that is, the introduction of a drag-reducing agent to ground fuels and an increase in the maximum operating pressure to 82 barg), Refining NZ has told the Inquiry it is confident that the RAP will have sufficient capacity to manage the forecast increase in demand through to 2030 and beyond.

### Summary of our findings

- At the current rate of demand, there is approximately 10–14 days of jet fuel in storage in the whole of the supply chain.
- Demand is expected to grow at around 3.5–4% a year, which falls between the high and base (mid) forecasts in the Jet Fuel Demand Forecast produced by Hale & Twomey. From a resilience perspective, it is reasonable and prudent to work with this forecast range.
- Refining NZ has a clear picture of the forecast increase in jet fuel demand and has projects underway to ensure that the RAP has sufficient capacity to manage this increasing demand.
- Based on these forecasts:
  - the number of days of cover provided by the storage at Wiri terminal, which has been reducing and now averages about four days, is due to fall below three days in 2022;
  - the Hale & Twomey projections forecast that the WAP will not be able to pump enough fuel to meet peak daily demand in the peak month of January by between 2021 (on the high forecast) and 2023 (on the mid forecast) and it is not currently realistic to plan to supplement it with large amounts of trucking; and
  - the JUHI now provides about two days of cover in an average month, less than two days in a peak month, and this will continue to reduce.
- Essential tank maintenance will put further stress on the storage capacity at Wiri and JUHI at various points in the next four years.

## 15 Is the jet fuel supply chain sufficiently resilient?

15.1 In our view, the answer to this question is simple: no. In this chapter, we explain why we reached that conclusion.

### The standards used to assess resilience

15.2 As noted in chapter 3, the Inquiry asked Fueltrac to assess the current and reasonably expected future security of the Auckland fuel supply chain, with a particular focus on jet fuel. Fueltrac used the following standards for that assessment:

- storage close to the airport;
- input supply capacity, compared with peak days' demand;
- the total days' cover in the supply chain compared with resupply time; and
- diversity of supply.

15.3 We consider the first three standards in this chapter. Diversity of supply is considered in chapter 17.

### Storage close to the airport

#### *How to determine an appropriate storage target*

15.4 Storage close to market – in this case, close to Auckland Airport – is an important protection against disruption because the fuel is close to where it is going to be used. The International Air Transport Association (IATA) has published guidance, which includes a framework for assessing the appropriate amount of fuel to store at an airport (the “IATA Guidance”).<sup>111</sup>

15.5 The IATA Guidance shows that the appropriate amount varies, depending on the particular characteristics of an airport. A benchmark of three days' cover is considered acceptable if the airport is supplied by a pipeline.<sup>112</sup> However, greater on-airport storage may be needed, depending on the level of risk associated with that supply chain.

15.6 For example, IATA notes that the Hong Kong Government requires Hong Kong International Airport to maintain 11 days' projected jet fuel demand on-airport, given the particular vulnerability of Hong Kong's fuel supply chain.<sup>113</sup>

#### *Setting a storage target for Auckland Airport*

15.7 We concluded that Auckland Airport should aim to store enough fuel to enable it to operate for 10 days at 80% of the fuel allowances for peak days. Auckland Airport is unusual because the Wiri storage facility is only 6 kilometres away. We consider it reasonable to consider Wiri and the JUHI together when assessing the amount of jet fuel storage close to the airport. However, we stress that this approach depends on there being a reliable method of transporting enough jet fuel from Wiri to the JUHI, to enable optimal use and operation of the JUHI storage.

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<sup>111</sup> IATA Guidance on Airport Fuel Storage Capacity (First Edition, May 2008).

<sup>112</sup> IATA Guidance on Airport Fuel Storage Capacity (First Edition, May 2008), Appendix 2, p. iv.

<sup>113</sup> IATA Guidance on Airport Fuel Storage Capacity (First Edition, May 2008), Appendix 4, pp. i and iii. The vulnerabilities include the absence of a refinery in Hong Kong; the airport not being fed by pipelines, making it dependent on shipments of fuel; berthing limitations; and the occurrence of tropical cyclones.

## 15 Is the jet fuel supply chain sufficiently resilient?

- 15.8 During the workshop on 30 May 2019, most of the invited participants accepted this was an appropriate resilience standard. The Inquiry agrees because:
- it falls within the range set out in the IATA Guidance and within the range that Fueltrac advised would be reasonable;
  - it took 14 days for fresh jet fuel to reach the JUHI after the 14 September 2017 RAP outage;
  - Refining NZ advised the Inquiry that in a one-in-20-year event that causes an outage along the RAP, it would expect to have the RAP repaired within 9–10 days;
  - there is no alternative jet fuel supply chain to Auckland Airport; and
  - Marsden Point refinery is some 170 kilometres from Auckland Airport.
- 15.9 We emphasise that this resilience standard is based on the particular risks associated with the existing jet fuel supply chain (in particular, single point of failure risk). If, for example, a second, permanent jet fuel supply chain to Auckland Airport were to be established, there could be a basis for reconsidering the appropriate standard for storage at Wiri and the JUHI.
- 15.10 We received differing views on how peak days' demand should be calculated for these purposes. The options were:
- the daily average demand for jet fuel across the peak month of a calendar year;
  - the actual peak day;
  - the thirtieth-highest day over a 12-month rolling average; or
  - the average of the top 30 non-contiguous peak days in a calendar year.
- 15.11 Of these, the Inquiry preferred the last option: the average of the top 30 non-contiguous peak days in a calendar year. This standard, which was supported by Fueltrac, represents a sensible middle ground.
- 15.12 Fueltrac assessed the current days' cover at Wiri and the JUHI at the low point of the supply chain to be around six days. BP, the JUHI operator at Auckland Airport, indicated that this figure seemed reasonable.<sup>114</sup> It also aligned with the information contained in the recent Hale & Twomey reports. Whichever way the peak days' demand was defined, this assessment fell well below the minimum standard that we are proposing.
- 15.13 The joint venture participants (the fuel companies) that are responsible for storage advised the Inquiry that it takes several years to build major new fuel infrastructure because:
- before approving large projects for Wiri, the WAP, and the JUHI, the joint venture participants follow a set process that is lengthy and involves multiple gateways;<sup>115</sup>
  - once a project is progressed through all the gateways and the three fuel companies have made financial commitments, it takes two to three years to build new tanks; and
  - it would take approximately four years to construct a second WAP, including around two years to obtain the relevant resource consents.
- 15.14 Given that discussions are still at an early stage on additional storage at or close to the airport, it could be three to five years before there is more storage built and ready to be used. This is of concern to the Inquiry, given the drop in days' cover that has already taken place and the rate at which it is forecast

<sup>114</sup> Response of BP Oil New Zealand Limited to Draft Report by Fueltrac Pty Limited (11 June 2019), para 20.

<sup>115</sup> We have examples where it has taken one to two years for this preliminary process to be completed.

## 15 Is the jet fuel supply chain sufficiently resilient?

to continue to decline. In our view, there needs to be a commitment to build additional storage at Wiri and the JUHI without delay.

### Input supply capacity into the JUHI, compared with peak days' demand

- 15.15 The Inquiry spoke with Melbourne Airport, which has recently agreed a new ground lease with the fuel company operators of its JUHI. The lease includes a performance standard that requires that the combined input capacity of the pipeline and other supply options (mainly trucking) into the JUHI exceeds 110% of the peak days' jet fuel demand<sup>116</sup> throughout the term of the lease.
- 15.16 For example, if the peak days' demand is forecast to be 10 million litres of jet fuel, the combined input capacity of the pipeline and other supply options should be more than 11 million litres of jet fuel.
- 15.17 Fueltrac advised that, from a resilience perspective, this is a reasonable standard for the capability of the supply systems to meet peak demand. It includes some spare system capacity to allow for such issues as supply chain outages or delays in transportation.<sup>117</sup>
- 15.18 The information provided to us showed that the combined input capacity of the WAP and the trucking facility into the JUHI currently exceeds this input standard.<sup>118</sup> However, if the trucking capacity is removed from this calculation, the WAP, by itself, does not meet the desired input standard.

### Total days' cover in the supply chain versus resupply time

- 15.19 This standard assesses whether the total days' cover in storage (over the whole supply chain) is sufficient to meet the estimated resupply time. As noted in paragraph 14.9, Fueltrac assessed the total days' cover at the low point of the supply cycle as approximately 10–14 days. Accordingly, the amount of days' total cover appears to be around four days short of the best-case resupply time, if a disruption or outage were to occur at the low point of the supply cycle.

### Our findings on whether the supply chain is sufficiently resilient

- 15.20 Putting all of this information and analysis together, we have concluded that the jet fuel supply chain to Auckland Airport is not sufficiently resilient for such an important piece of national infrastructure.
- 15.21 We have concluded that the appropriate resilience standard for storage should be sufficient storage volume between the JUHI and Wiri to provide 10 days' cover at 80% of peak operations, calculated on the average of the 30 non-contiguous peak days across the year.
- 15.22 Applying this resilience standard:
- currently, there is not enough jet fuel storage at Wiri and the JUHI to provide an appropriate level of cover; and
  - the amount of cover is forecast to continue to decrease if there is no investment in additional infrastructure in the near future.
- 15.23 We have concluded that the appropriate resilience standard for input capacity into the JUHI is that it should maintain capacity of 110% of peak days' demand. Applying this resilience standard to the WAP alone, it already does not meet it. Moreover, the WAP is close to reaching its capacity limit and soon it will not be able to meet the demand.
- 15.24 The resilience standard is met if trucking capability is included. However, we consider that trucking should not be relied upon at the moment for the transfer of significant quantities of jet fuel (which

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<sup>116</sup> Melbourne Airport defines this as the thirtieth-highest demand day from the previous 12-month period.

<sup>117</sup> Fueltrac report, p 26.

<sup>118</sup> This measure will be exceeded when peak days' jet fuel demand is 5.5 million litres or more.

## 15 Is the jet fuel supply chain sufficiently resilient?

would require many trucks), given Auckland Airport's view on the disruption that it would cause to the airport's normal operations around the domestic terminal.

15.25 In our view, investment is required immediately to increase the input capacity into the JUHI in ways other than trucking. Urgent decisions are also needed on the construction of new storage tanks.<sup>119</sup>

15.26 This conclusion is consistent with the various Hale & Twomey reports that were provided to the Inquiry. In those reports, Hale & Twomey repeatedly noted that:<sup>120</sup>

- additional jet fuel tanks will be required at the Wiri terminal between 2020 and 2025 to manage peak supply months;
- the WAP pipeline system is nearly at capacity; and
- extra storage capacity is likely to be required at the JUHI to maintain sufficient buffers.

15.27 As noted in the 2018 Capacity Review, the amount of stock cover at the Wiri terminal and the JUHI does not provide nearly as much protection as used to be the case, even as recently as 2014.<sup>121</sup> The 2018 Capacity Review added that, had the 2017 RAP outage occurred in 2014, the most severe allocation percentage for the airlines would have only needed to be 50–60%, rather than 30%.<sup>122</sup>

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<sup>119</sup> Z Energy told the Inquiry that a second WAP would add diversity of supply and provide a sound basis for considering the combined Wiri and JUHI storage as effective on-airport storage. They had the opinion that it might not be necessary to build additional storage at the JUHI. Instead, it might make better sense to invest in additional storage at Wiri only.

<sup>120</sup> 2019 WOSL Report, pp 1, 14, 17–18; Hale & Twomey and WorleyParsons, *Jet Fuel System Resilience and Capacity Review* (June 2018), pp. 29–30; Hale & Twomey, *Auckland and Auckland Airport Product Supply Chain Resilience* (February 2017), pp. 2, 24–25.

<sup>121</sup> Hale & Twomey and WorleyParsons, *Jet Fuel System Resilience and Capacity Review* (June 2018), p. 25.

<sup>122</sup> Hale & Twomey and WorleyParsons, *Jet Fuel System Resilience and Capacity Review* (June 2018), p. 25.

## 15 Is the jet fuel supply chain sufficiently resilient?

### Summary of our findings

- Appropriate resilience standards for the existing (single) jet fuel supply chain are:
  - storage capacity at Wiri and the JUHI sufficient to provide 10 days' cover for operations at 80%, based on the average of the 30 non-contiguous peak days; and
  - input capacity to the JUHI of 110% of peak days' demand.
- Applying the storage resilience standard, there is already inadequate jet fuel storage at Wiri and the JUHI, and the level of cover will continue to decrease if no new tanks are built.
- Applying the input capacity resilience standard, the WAP currently does not provide sufficient capacity on its own. Further, it has nearly reached the limit of its capacity and soon it will not be able to meet forecast demand.
- Making up the input capacity shortfall by trucking additional fuel from Wiri to the JUHI is theoretically possible and would bring the input capacity above the target range for a few years. However, this is currently not a feasible option, other than for modest amounts or in exceptional circumstances.
- Investment decisions are needed without delay to:
  - increase the input capacity into the JUHI; and
  - construct additional storage at both Wiri and the JUHI.
- From a resilience perspective, the infrastructure making up this supply chain is already inadequate. Without investment, its resilience will quickly decrease further, given the forecast demand for jet fuel.

## 16 Will the needed investment be made in a timely way?

16.1 In this chapter, we explore the reasons for the decline in the resilience of Auckland's jet fuel supply chain and whether future timely investment to improve its resilience is likely to occur.

### Why has resilience declined?

#### *Significant growth in jet fuel demand*

16.2 As already explained (see paragraph 14.13), jet fuel demand at Auckland Airport has effectively doubled over the last 20 years, with nearly half of that growth occurring in the last four years. The recent growth apparently took the industry by surprise. Nobody had forecast this significant level of increase.<sup>123</sup>

#### *Uncertainty about the relocation of the JUHI*

- 16.3 Over the past decade, Auckland Airport has been considering decommissioning the current JUHI site and moving it to a different location at the airport, because the present JUHI location is incompatible with their plans to relocate the domestic terminal and expand regional airline services.
- 16.4 In 2007, Auckland Airport carried out a review (in conjunction with fuel company and airline stakeholders) to determine the best possible site for a new JUHI. The preferred site was Orrs Road, mainly because it is close to Wiri and it would be easy to connect it to the WAP. Auckland Airport obtained planning permission and a designation to enable a new JUHI to be built there.
- 16.5 Auckland Airport told the Inquiry that their thinking has evolved significantly in the light of their major expansion plan. They had recently convened an industry working group consisting of representatives from BP, Mobil, Z Energy, BARNZ, and Air New Zealand (with support from WorleyParsons) to look at the location issue again. This working group is providing advice and input into Auckland Airport's process for making a final decision on the location of the new JUHI. Three sites are being assessed (including Orrs Road).
- 16.6 Although Auckland Airport had previously expressed an intention that the existing JUHI would continue to operate until 2035, the JUHI joint venture participants repeatedly raised concerns with us about the possibility that the lease could be terminated early. The Airport Authorities Act 1966 includes a statutory power for an airport to terminate such a lease at any point, without compensation, although we are unaware of any instances where an airport has successfully used this power.
- 16.7 The JUHI participants said they were unlikely to make decisions to invest in new and expensive infrastructure at the current JUHI location if they did not have more certainty that the lease would continue. Otherwise, they saw a risk that they would be left with a "stranded asset" that was not able to generate a return on the initial investment.
- 16.8 This issue was raised again at the forum we held, where Auckland Airport stated they had no intention of ending the lease early.<sup>124</sup> In our view, this assurance should be sufficient to resolve the concern of the JUHI joint venture participants.<sup>125</sup>

<sup>123</sup> Hale & Twomey and WorleyParsons, *Jet Fuel System Resilience and Capacity Review* (June 2018), p. 28; Z Energy Response to Minute No. 5: Forum Issues (24 May 2019), p. 8.

<sup>124</sup> Gavin Evans, *Industry split on Auckland jet fuel options* (Scoop, 6 June 2019):

<http://www.scoop.co.nz/stories/BU1906/S00143/update-industry-split-on-auckland-jet-fuel-options.htm>

<sup>125</sup> However, we noted that Auckland Airport's plans available on its website appeared to indicate that the existing JUHI will not be in its current location by 2030. Auckland Airport has told us it will update this information to reflect its commitment not to end the existing JUHI ground lease early.

## 16 Will the needed investment be made in a timely way?

### **Sector governance and joint venture arrangements**

- 16.9 The qualities of a resilient system include good governance and effective leadership that ensure investment and actions are appropriate and timely.
- 16.10 The Inquiry understands that joint ventures can have strong community benefits: they can be used to provide a product or service more efficiently than when the product or service is provided by separate entities. Joint ventures can provide efficiency gains from economies of scope and scale, and can help to avoid the high costs associated with duplication of assets.<sup>126</sup>
- 16.11 However, joint ventures also have their disadvantages. The Inquiry believes that for several reasons, the current joint venture governance arrangements for the Wiri terminal, the WAP, and the JUHI have been a significant contributing factor in the reduction of the resilience of this infrastructure.
- 16.12 First, the separate arrangements at each point of the supply chain result in a very complex ownership and governance structure. We described these in chapter 2 and illustrated them in Figure 2.
- 16.13 Second, investment decisions should be timed so that step changes are six months too early, rather than two years too late. Our perception from the fuel companies that make up the three joint ventures in the single jet fuel supply chain is that they are focused on meeting the demand curve (or, as is the current situation, catching up with the curve after a rapid increase in demand). We note the observation in the 2018 Capacity Review:<sup>127</sup>

*While forecasting is uncertain and outside factors can make sharp (positive and negative impacts) on demand, planning for next investment steps should be done in advance. This is done for RAP, with work now being undertaken on the steps (stages) of future investment to capture an additional 40% capacity. [It] would appear that this is not the case for Wiri Terminal and Auckland JUHI, although work has been done to ensure there is the ability to expand Wiri Terminal under council planning and zoning changes. It would seem sensible that these facilities also have future investment stages identified and planned for, so that once certain triggers are reached (e.g. after investment now, should resilience fall to 2014 levels again), then the next investment step could be actioned.*

- 16.14 We agree with these comments. In fact, the Inquiry finds them particularly concerning in the light of the sharp drop in the resilience provided by the storage at Wiri and the JUHI in recent years, driven by unforecast growth in demand at Auckland Airport, and the fact that lead times for deciding on and building new infrastructure are long (for example, three to five years in total).
- 16.15 Third, the joint venture arrangements for Wiri, the WAP, and the JUHI usually require unanimous agreement by all three fuel companies to make investment decisions: that is, three different companies with three different internal decision-making processes, priorities, risk appetites, and opinions on what is economically feasible.<sup>128</sup>
- 16.16 The decision-making process for investment in the Wiri terminal requires each fuel company to individually instruct WOSL to proceed to a “gateway” for a project (for example, preparing a business case to +/- a certain part of the budget), rather than instructing WOSL as a group. There are multiple

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<sup>126</sup> In this regard, see Australian Government Productivity Commission, *Economic Regulation of Airports, Draft Report* (February 2019), p 246.

<sup>127</sup> Hale & Twomey and WorleyParsons, *Jet Fuel System Resilience and Capacity Review* (June 2018), p 28.

<sup>128</sup> While unanimity is the preferred route, one or two members of the joint ventures can proceed with investments at their own cost, providing this does not adversely affect other members. However, the Inquiry was told that this has been used only once to date, when Z Energy invested in facilities to support biofuels. Z Energy also told the Inquiry that the options for all companies to invest in the particular project must first be exhausted.

## 16 Will the needed investment be made in a timely way?

gateways and WOSL can usually only proceed with the unanimous approval of all shareholders at each point.<sup>129</sup>

- 16.17 This process ensures careful consideration of all options and produces robust business decisions. However, it also slows down decision making on major investments. The delays associated with this decision-making process must be factored into the joint venture participants' investment planning.
- 16.18 During this Inquiry, the fuel companies showed that they do not currently agree on where and how much investment is required. Table 10 illustrates this, setting out the various positions of the parties in their written submissions and oral submissions during the forum.
- 16.19 The Inquiry has been advised that in Australia, vertically integrated oil companies, operating strategic jet fuel infrastructure under identical arrangements, have been slow to provide capital for new infrastructure investments.<sup>130</sup> The Australian Productivity Commission has made similar comments in its draft report, the *Economic Regulation of Airports*,<sup>131</sup> as did Melbourne Airport when we spoke to them.

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<sup>129</sup> WOSL Capex/OPEX Approvals Process Timelines (February 2019).

<sup>130</sup> Fueltrac report, pp 7–8.

<sup>131</sup> Australian Government Productivity Commission, *Economic Regulation of Airports, Draft Report* (February 2019), pp. 260–261 (<https://www.pc.gov.au/inquiries/current/airports-2019#draft>). A final version of the report had not been publicly released before the publication of the Inquiry's report.

**16 Will the needed investment be made in a timely way?**

**Table 10: Summary of the joint venture participants' written and oral submissions at the forum**

	<b>BP</b>	<b>Mobil</b>	<b>Z Energy</b>
<b>Wiri terminal</b>	BP told the Inquiry that it would be sensible for additional jet fuel storage to be established at the Wiri terminal. It proposed two new 11 million litre tanks at the Wiri terminal, to provide additional cover of approximately 4–5 days. Provisional funding has been approved in its capital plans for its share (28%) of the capital cost for constructing these two tanks, subject to an approved business case. Once all of the WOSL shareholders have provided funding approval, it will take around two years to build these tanks.	In its written submission, Mobil told the Inquiry that one form of future investment in additional storage might be required at or near Auckland Airport if actual demand follows the Jet Fuel Demand Forecast. The timing, location, and configuration of additional storage are yet to be determined and are dependent on market demand. There are, however, preliminary concepts for additional jet fuel storage tanks at WOSL.	Z Energy is investigating having more tanks at Wiri and is currently exploring options to build three 13 million litre tanks on Roscommon Road. Z Energy was unsure whether two 11 million litre tanks would be sufficient to build resilience, and there might still be a deterioration of resilience based on jet fuel demand growth. Z Energy has pre-approved capex to invest in the supply chain to a material degree, but exactly where and how is still to be finalised.
<b>JUHI</b>	BP told the Inquiry that additional jet fuel storage is required at the existing JUHI prior to the expiry of the lease there (in 2035). It would take 2–3 years to build additional storage at the JUHI once all parties have provided funding approval. However, Auckland Airport has the ability to terminate the JUHI lease without compensation (under the Airport Authorities Act 1966).	In its written submission, Mobil said the existing JUHI participants are currently considering a preliminary business case for additional storage at the JUHI. This is at an early stage and will need to consider a number of factors, including land availability, land tenure, and funding.	Z Energy told the Inquiry there is an opportunity to increase storage at the JUHI, although the probable move of the facility by 2035 likely makes this option economically infeasible.
<b>WAP</b>	BP is open to considering the feasibility of a second WAP. However, it would prefer installing additional loading capability and significantly increasing transportation to the JUHI via truck. It would not be commercially feasible for a single entity to fund these options. The better option is to increase the capacity of the existing WAP.	Mobil said that additional WAP capacity may be required if actual demand follows the Jet Fuel Demand Forecast. It is not necessarily supportive of duplicating the WAP, noting, “[d]uplicating the WAP necessarily involves a large one-off capital investment that will deliver substantial excess capacity once complete, resulting in substantial capital inefficiency and unnecessary costs for consumers”. Mobil is, however, supportive of continued development and optimisation of truck-bridging capability between Wiri and the JUHI.	Z Energy said a second WAP along the current easement is needed for all resilience scenarios. This would address the single point of failure risk of transferring jet fuel between Wiri and Auckland Airport and mitigate the current concern of reduced days’ cover at the existing JUHI facility. It said the WAP is the biggest current constraint on supply to the airport. Investment in a second WAP would provide the “best bang for the buck”. It considers that any solution involving trucking is not a reliable, efficient, safe, or environmentally sustainable option for jet fuel. Z Energy would prefer to invest in a second WAP before building more storage at the JUHI.

### CASE STUDY: MELBOURNE AIRPORT<sup>132</sup>

The JUHI at Melbourne Airport is operated under a joint venture arrangement between the four major oil companies: BP, Viva (previously Shell), Exxon Mobil, and Caltex. The JUHI is supplied by a pipeline owned by a different consortium of oil companies and an independent investor. There are also facilities at the airport that allow unloading at the JUHI by truck.

Melbourne Airport told us that the oil companies were aware of the rapid growth in jet fuel demand at Melbourne Airport for international long-haul demand from 2014 onwards (passenger growth consistently 10% per annum). However, the pipeline owners and the JUHI joint venture participants had not made any investments to increase the input capacity into the JUHI or increase the on-airport storage. Separately, Mobil told us that for a period, there was only eight hours' jet fuel stock cover at the Melbourne Airport JUHI.

We understand that during certain periods in 2016 and early 2017, the peak days' demand exceeded input supply capacity to the airport and jet fuel rationing was required.

Negotiations with the oil companies were already underway because the JUHI ground lease was about to expire. Melbourne Airport informed us that it had decided that it wanted a new agreement that, among other things, would ensure there was enough input capacity and on-airport storage to meet Melbourne Airport's current and future needs.

Melbourne Airport said it had escalated this issue and engaged the support of the Victorian State Government when a new-entrant airline, which intended to provide services between Asia and Melbourne, decided to pull out from Melbourne Airport because it could not obtain jet fuel. The Victorian Government formed a round table working group with key industry stakeholders.<sup>133</sup>

Melbourne Airport and the four major oil companies negotiated a new lease agreement in 2018, which prescribed (among other things) safeguards to ensure continued investment in the JUHI facilities, covering input capacity, onsite storage, fuel hydrant infrastructure, and open access, to promote competition in the fuel supply at Melbourne Airport. The new agreement required that:

- the combined input capacity of the pipeline and truck facilities to the JUHI should meet 110% of the peak days' jet fuel demand at Melbourne Airport throughout the term of the operating lease; and
- the days' cover from on-airport storage should meet three days, in line with International Civil Aviation Organisation standards.

A process is in place for determining when investment needs to occur in the JUHI facility and associated fuel hydrant network. Melbourne Airport told us that it meets with the JUHI operating committee monthly, quarterly, and annually, and as part of that process, the parties map out the jet fuel demand forecasts for the next five years. Where the forecasts show that capacity is getting close to falling below the threshold, the operating lease factors in a lead time of up to three years (depending on the infrastructure), to enable the JUHI joint venture participants to plan and construct infrastructure to address the forecast demand increase.

The operating licence also requires the JUHI to implement an open-access regime to enable suitably qualified industry participants to apply for access to the JUHI facility to provide jet fuel.

Failure to deliver these requirements can result in a breach of the operating licence.

<sup>132</sup> This case study is based on information provided to us by Melbourne Airport. We acknowledge that Mobil provided us with a different recollection of the events that occurred in Melbourne.

<sup>133</sup> This included members from industry, airlines, the Board of Airline Representatives of Australia (BARA), and the Victorian Government.

## 16 Will the needed investment be made in a timely way?

### What investment is likely?

16.20 The Inquiry asked the relevant participants about their investment plans for the infrastructure that makes up the Auckland jet fuel supply chain. In this section, we summarise what they told us.

#### ***Marsden Point refinery and the RAP***

16.21 Refining NZ intends to convert a tank from diesel to jet fuel at the Marsden Point refinery to meet increasing demand and for jet fuel imports. The conversion requires the diesel tank to be completely refurbished, including the replacement of the tank roof and the addition of a special coating to the tank's interior. The Inquiry understands that this project will add an additional 18 million litres of jet fuel storage.

16.22 Refining NZ is also taking steps to increase the capacity of the RAP, including:

- trialling the use of drag-reducing agents in diesel and gasoline, as explained in Paragraph 2.38;
- increasing the maximum operating pressure to 82 barg; and
- investigating whether a further material increase in capacity could be achieved by installing three additional intermediate pump stations along the RAP. This work is at an early stage, but potential parcels of land are being identified for the additional pump stations.

16.23 Based on this information, we are satisfied that Refining NZ is working to make timely investment decisions. They have a clear goal of having new infrastructure in place shortly before it is needed to meet demand, rather than just in time or too late. We are satisfied that investment is likely to take place so that the resilience of these facilities to meet the stress of increasing demand is not reduced.

#### ***The Wiri terminal, the WAP, and the existing JUHI***

16.24 The same cannot be said about the Wiri terminal, the WAP, and the existing JUHI. As the Inquiry found, there has been a significant decline in the resilience provided by these facilities.

16.25 The Inquiry understands that there is a project currently underway to upgrade the automation capability of the WAP.<sup>134</sup> This is, however, only an operational improvement and we understand it will provide only an incremental increase of approximately 5% in the volume of jet fuel that can be transferred each day. Some work is also being done to determine the maximum flow rate capacity down the WAP.<sup>135</sup>

16.26 The three fuel companies that are the joint venture participant owners of the Wiri terminal, the WAP, and the JUHI have so far not committed to the investment we think is needed to achieve and maintain the minimum resilience standards they agree are appropriate.

16.27 In early July 2019, following the Inquiry's workshop and forum sessions, we were told that the three major fuel companies have agreed to advance a Front-end Engineering Design for additional tanks at Wiri, which is the first gateway in their decision-making process. While they have committed to and started a process for investing in tanks, they have not been able to give the Inquiry confidence that the needed investment will occur. They could not give us any estimate of how long this decision-making process would take, nor any definite commitment that tanks would actually be built at the Wiri terminal. Nor could they provide the Inquiry with a definite commitment that they would invest to increase the capacity of the WAP or storage at the JUHI.

<sup>134</sup> Submission of BP Oil New Zealand Limited on the Forum Issues set out in the Inquiry's Minute No. 5 (27 May 2019, p. 6; Response by WOSL to Request for Information (12 April 2019), para 4.23.1.

<sup>135</sup> Response by WOSL to Request for Information (12 April 2019), para 4.23.2.

## 16 Will the needed investment be made in a timely way?

16.28 At the workshop and forum sessions, the airline representatives and Auckland Airport stated their concern that there was a lack of transparency of information from the joint venture participants about their planning and timelines for investing. Given the now obvious need for additional infrastructure to respond to forecast increases in jet fuel demand, they said it was creating significant customer uncertainty. The Inquiry endorses this concern.

### **Our findings on whether investment is likely to occur**

16.29 We have concluded that the reduction in the resilience of the Auckland fuel supply chain since 2014 has resulted from a combination of:

- the significant growth in jet fuel demand over the last four years, which was not forecast by the three fuel companies that are the joint venture participants for most of the relevant infrastructure;
- the lack of consensus between the fuel companies that own the Wiri terminal, the WAP, and the JUHI on what investment needs to occur, and when, in relation to those pieces of infrastructure; and
- uncertainty about the timing for the relocation of the current JUHI to a new location and about where the new JUHI will be located.

16.30 The Inquiry is satisfied that Refining NZ is likely to make timely investment decisions to ensure the capacity of the Marsden Point refinery and the RAP will continue to meet forecast increases in jet fuel demand.

16.31 We are not satisfied that the three fuel companies that own the Wiri terminal, the WAP, and the JUHI will make timely decisions to invest in needed infrastructure.

16.32 We have now identified the minimum quantities of storage and input capacity that we regard as appropriate resilience standards. We expect the major fuel companies that own this infrastructure to commit to work towards meeting these resilience standards.

16.33 The Inquiry observes that the lead time for making a decision and building large infrastructure such as storage tanks can be as long as three to five years when the joint venture decision-making process to begin a project is included. Even if the companies make decisions to invest in new storage tanks and additional input capacity this year, neither will come on-stream for some years. By that time, the resilience assessment will be even lower than it is now.

16.34 It appears that the debate and interaction created by our Inquiry work may have raised the profile of these issues with the three major fuel companies. The documents they have recently provided suggest an increased focus in the last few months. However, they are still some way from any confirmed decisions to invest in new infrastructure.

## 16 Will the needed investment be made in a timely way?

### Summary of our findings

- Resilience of the jet fuel infrastructure has reduced because of unforeseen high growth in the demand for jet fuel at Auckland Airport, the lack of agreement between the three major fuel companies about what investment might be needed, and uncertainty created by the prospect that the JUHI could be moved at some point.
- Refining NZ is likely to make timely investment decisions to maintain the capacity of the refinery and the RAP to meet future demand.
- We are not satisfied that the three fuel companies that own the Wiri terminal, the RAP, and the JUHI will make timely decisions to invest in the needed infrastructure.
- We have now identified the minimum quantities of storage and input capacity that we regard as appropriate resilience standards (and we held a workshop on these matters). We expect the major fuel companies that own this infrastructure to commit to work towards meeting these resilience standards.
- The process by which the three fuel companies make decisions can take several years.

## 17 Alternative methods of supplying jet fuel to Auckland Airport

### There is no permanent, second supply chain for jet fuel to Auckland Airport

- 17.1 We identified that diversity of supply – having alternative ways of bringing fuel to a market – increases the resilience of the fuel supply system (see Table 3). Unfortunately, at present there is no permanent second supply chain for jet fuel to Auckland Airport. The supply chain is vulnerable to single point of failure risk all the way along it.
- 17.2 We compared Auckland Airport to other airports in Australia, namely Sydney, Brisbane, Melbourne, and Perth. We make the following observations:
- Sydney, Brisbane, and Melbourne have diversity of supply of jet fuel to the airport.
  - If there were a long-term fuel disruption event in Sydney and Melbourne, the second supply chain could be scaled up.
  - The JUHI at Brisbane Airport is supplied by two pipelines, from different directions and using different pipeline easements. The capacity on each of these pipelines exceeds total daily airport demand. Accordingly, if one of the pipelines were to suffer a long-term outage, the other could supply all the fuel the airport needs.
  - By contrast, Perth, like Auckland, is vulnerable to a single point of failure risk. It has one dedicated fuel pipeline as its single source of supply of jet fuel.
- 17.3 Auckland Airport is roughly comparable to Brisbane Airport in terms of the total number of aircraft movements, the total number of passengers, and jet fuel consumption.
- 17.4 We note that Perth Airport has expressed concern about the potential single point of failure risk along its fuel supply chain. It identified “security of supply” (including “multiple modes of fuel delivery and adequate on-airport storage to mitigate the risk of supply disruption”) as a core principle that should apply to its jet fuel supply chain.<sup>136</sup>
- 17.5 Each airport is different and jet fuel supply chains to airports are usually the result of historical decisions, rather than deliberate design from a resilience perspective. However, this should not distract from the fact that Melbourne, Sydney, and Brisbane have diversity of supply. Auckland and Perth do not.
- 17.6 During the closed workshop and the public forum, most participants considered that the development of a permanent, second, independent jet fuel supply chain, if that was possible, would be the most effective method of enhancing resilience. Participants told us that a second supply chain would:
- enable continuity of supply in all disruption scenarios;<sup>137</sup>
  - mitigate the single point of failure risk along the existing Auckland jet fuel supply chain; and
  - enhance the resilience of the jet fuel supply chain in the face of disruptive events that last more than 10 days.<sup>138</sup>

<sup>136</sup> Perth Airport Pty Ltd, *Economic Regulation of Airports Public Inquiry* (September 2018), pp 82–83.

<sup>137</sup> Gull New Zealand Limited Response to Minute No. 5: Forum Issues (27 May 2019), p 4.

<sup>138</sup> Z Energy Response to Minute No. 5: Forum Issues (received 24 May 2019), p 9.

## 17 Alternative methods of supplying jet fuel to Auckland Airport

17.7 The 2018 Capacity Review also noted the significant difference an alternative supply chain can make, even if it only caters for a small amount of an airport's total daily demand for jet fuel:<sup>139</sup>

*During the 2017 RAP outage, airlines were initially allocated 30% of normal demand at Auckland Airport. If an alternative supply option could meet 10% of normal demand, this would provide significant benefit during a disruption. As an example, for the 2017 RAP outage this may have resulted in 40% allocations which would have been a 33% increase in supply to the airlines.*

17.8 In addition, during the forum, BARNZ told us that new-entrant airlines considering providing services to an airport would carry out a risk assessment of that airport, including consideration of the availability and security of jet fuel. It noted that a second jet fuel supply chain is one of the structural points that airlines take into account when considering this risk.

17.9 We also heard that a permanent second supply chain is preferable to back-up supply chains that can only be used in the event of a disruption. If the second supply chain is already established, then no time is lost in setting up supply. Fueltrac identified a number of possible sources of delay when setting up a temporary, back-up supply chain, including time lost in:<sup>140</sup>

- the recommissioning of temporary trucking facilities;
- converting tanker trucks from diesel to jet fuel service by modifying couplings and cleaning them (which usually takes three to four days);
- finding appropriately qualified and trained drivers;
- training people to operate the back-up system; and
- repositioning trucks and drivers to initiate the emergency response.

17.10 Further problems with back-up supply options are that:

- infrastructure and machinery set aside for emergency use may not have been regularly used or tested, which could mean delays in making it operational; and
- although diesel trucks can be modified, this can create issues with the ongoing supply of ground fuels in an emergency situation because the trucks would no longer be available to transport diesel. As BP cautioned, "It should not be assumed that ground fuel supply will necessarily be able to be sacrificed to meet jet fuel requirements".<sup>141</sup>

17.11 The delays associated with establishing a back-up supply chain were demonstrated during the RAP outage:

- It took eight days to construct a temporary jet fuel loading gantry at the Marsden Point refinery so that jet fuel could be trucked from the refinery.
- It was 12 days before trucks could begin supplying the JUHI from Wynyard Wharf.

17.12 For these reasons, we concluded that the establishment of a permanent second jet fuel supply chain to Auckland Airport (independent of the RAP, the Wiri terminal, and the WAP) would enhance the resilience of the jet fuel supply to Auckland Airport.

<sup>139</sup> Hale & Twomey and WorleyParsons, *Jet Fuel System Resilience and Capacity Review* (June 2018), p 21.

<sup>140</sup> Fueltrac report, p 22.

<sup>141</sup> Response of BP Oil New Zealand Limited to Draft Report by Fueltrac Pty Ltd (11 June 2019), para 23.8.

### Is someone likely to invest to create a second supply chain?

17.13 Several participants spoke to the Inquiry about the possibility of establishing a second supply chain for jet fuel. This was encouraging, even though all of the thinking is still at a preliminary stage.

17.14 None of the participants suggested that they were considering construction of a second RAP. Fueltrac gave us a ballpark estimate that a new pipeline to duplicate the RAP could cost around \$425 million.

17.15 Nor are any parties considering shipping jet fuel to a port in Auckland. With the Wynyard Wharf facilities gone, there does not appear to be any other suitable land for storage tanks in the port area in central Auckland. We were also told it is not particularly desirable to put fuel storage close to residential and office accommodation.

17.16 However, two other options for alternative supply chains were discussed during the forum sessions:

- a trucking option from Marsden Point or Mount Maunganui (being explored by Gull); and
- a rail option from Mount Maunganui (being explored by Z Energy, BP, and Mobil as part of the Auckland Jet Fuel Resilience Group).

### **Trucking option from Marsden Point or Mount Maunganui (Gull)**

17.17 Gull informed the Inquiry that it intends to enter the Auckland jet fuel market within the next one to three years. It proposes to do so by establishing a second jet fuel supply chain by importing refined jet fuel into a New Zealand port and trucking it to Auckland Airport. It has investigated two possible ports:

- Marsden Point, where it would build a truck load-out facility next to the refinery; or
- Mount Maunganui, where it would build jet fuel storage tanks and a load-out facility.

17.18 During the forum, Gull told the Inquiry that it had applied to join the JUHI at Auckland Airport so it could truck the jet fuel to the JUHI and feed it into the hydrant system from there. There is no other way of providing any significant volume of fuel to airline customers. However, Gull did not yet know what the likely cost would be.

17.19 In a submission we received after the forum, Auckland Airport advised that it does not consider trucking fuel to the JUHI to be a viable option, for traffic management reasons. Specifically, Auckland Airport told us:<sup>142</sup>

*Auckland Airport's core aeronautical precinct is not designed to support regular large format trucks or high volumes of trucking. Within the last 12 months Auckland Airport has invested specifically to remove truck movements from the core precinct by developing a peripheral road link specifically for this purpose and implemented heavy vehicle restrictions and penalties pursuant to the Auckland International Airport bylaws for unauthorised access. Every tanker truck delivery would involve traffic management, in particular the complete closure of the core precinct's domestic terminal access roads twice for each truck delivery (i.e., 20 road closures per day to facilitate 10 tanker truck deliveries). The impact of this would be significant given 50% of all passengers use the domestic terminal.*

17.20 Auckland Airport would prefer that any trucked jet fuel be delivered to Wiri (although at present, Wiri cannot receive fuel from trucks). We understand that it has conveyed this view to Gull as well.<sup>143</sup> However, Mobil told us:<sup>144</sup>

<sup>142</sup> Letter from Auckland Airport to Inquiry Chair (11 June 2019).

<sup>143</sup> Email from David Bodger to Inquiry secretariat (4 July 2019).

<sup>144</sup> Spreadsheet attached to Letter from Mobil to Inquiry Chair (26 July 2019).

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*Whilst recognising trucking to Auckland Airport may impact traffic flow, this option should be explored ahead of trucking upstream of the JUHI. It has already been concluded that having a second supply chain enter the system as close to the airport is preferable. Trucking upstream of the JUHI puts more strain on existing infrastructure downstream of where the trucking layer enters and reduces the overall resilience of the trucking layer.*

17.21 In the Inquiry's view, trucking may be inevitable in the short term, given the capacity constraints we have identified with the WAP and the time that it would take to build a second WAP.

17.22 As discussed in paragraphs 16.3–16.8, the existing JUHI needs to be moved to a new site to accommodate the relocation of Auckland Airport's domestic terminal and expansion of regional airline services. Auckland Airport is in the process of making a final decision on the location of the new JUHI. It is important that the final decision about its location takes into account resilience considerations, including the ability to supply jet fuel to the Airport via a permanent second supply chain, whether via truck, train, or another method of supply.

### ***Train option from Mount Maunganui (Z Energy, BP, and Mobil)***

17.23 During the forum, Z Energy told the Inquiry that it had identified the possibility of transporting jet fuel from Mount Maunganui to Auckland Airport using rail. This option would require:

- the conversion of tanks at Mount Maunganui to store jet fuel;
- the construction of new rail loading infrastructure (at Mount Maunganui) and discharge infrastructure (at Wiri); and
- the construction of infrastructure to transport jet fuel from the rail siding at Wiri to Auckland Airport.

17.24 Z Energy told the forum that:

- it had been talking to existing joint venture participants, but the option could also involve new participants;
- it had done enough work with the other joint venture participants to establish that this option is operationally feasible, including speaking to both KiwiRail and the landowner of the discharge point at Wiri;
- it would take several years to deliver this option; and
- the fundamental question was whether this represents a reasonable amount to spend on improving resilience for a high-cost, low-probability event like the 2017 RAP outage.

17.25 The Inquiry understands that this option has been the subject of discussion as part of the Auckland Jet Fuel Supply Resilience Group. However, the focus of the group has recently shifted to shorter-term options that BP, Mobil, and Z Energy may be able to agree on as a minimum.<sup>145</sup> BP informed us that the Group is continuing to consider the Mount Maunganui jet fuel supply option as well.

17.26 The consideration of these options is still at an early stage. All of them would involve a substantial commitment of energy and money. We do not have a view on whether any of the companies considering these possibilities, or others, will ultimately invest in them. Under the current industry settings, it is for the participants in the market to decide what is financially viable for them.

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<sup>145</sup> Letter from Z Energy to Inquiry secretariat (4 July 2019).

### Are there barriers to investment in an alternative jet fuel supply chain?

- 17.27 We have noted that some parties are considering the possibility of investing in a second supply chain. Aside from the economics of that decision, we asked whether there were other barriers that might prevent or inhibit such an investment.
- 17.28 The WAP and the JUHI operate under what is known as a restricted-access regime. Restricted access means that jet fuel suppliers cannot simply pay a fee to access the infrastructure but are required to purchase an equity stake in it before they are given access. Accordingly, in order to obtain access to the WAP and the JUHI, a new entrant would be required to pay a purchase price for a share in the infrastructure. An accession process, with qualifying criteria, is set out in the joint venture agreements for the WAP and the existing JUHI (which we have seen). Ultimately, it is for the Operating Committee for each piece of infrastructure, made up of the existing joint venture participants, to decide whether to grant access to the new entrant.
- 17.29 The Inquiry is not aware of a set process governing how third-party jet fuel suppliers can access the facilities at Wiri. However, a potential new entrant can always attempt to negotiate access with the current owners.
- 17.30 In our view, these access regimes create barriers for new entrants to the jet fuel supply market, as explained in the following sections.

### Conflict of interest

- 17.31 Wiri, the WAP, and the existing JUHI are each the subject of a joint venture arrangement. Key decisions of the joint venture participants usually require unanimity.<sup>146</sup>
- 17.32 The jet fuel supply chain is also the subject of vertical integration. BP, Mobil, and Z Energy are involved in each part of the supply chain, from the importing of crude oil through to delivery of jet fuel into the plane. In other words, they are responsible for the importing, storage, transfer, and sale of jet fuel at each stage of the supply chain.
- 17.33 Other fuel suppliers who are looking to access Wiri, the WAP, or the existing JUHI would be competing for the three incumbents' customers (that is, the airlines) at the end stage of the supply chain when the fuel is sold. This gives rise to a conflict of interest: there is an incentive for the incumbent joint venture participants to deny or inhibit access to new entrants who will compete with them as sellers of jet fuel.<sup>147</sup>
- 17.34 We acknowledge that Caltex was admitted to the WAP and the JUHI in the late 1980s. We are not aware of any other example of a party seeking admission to the JUHI in New Zealand (other than Gull's current application).<sup>148</sup>

### The requirement to purchase an equity share

- 17.35 The requirement that a new entrant purchase an equity share can create risk for potential new entrants who are in the early days of setting up a supply chain. It is a substantial cost when they are still determining whether they can establish and grow a market, at least when compared with non-

<sup>146</sup> *Z Energy Limited and Chevron New Zealand* [2016] NZCC 10, footnote 47. As noted earlier, while unanimity is the preferred route for making decisions, one or two members of the joint ventures can proceed with investments at their own cost, providing this does not adversely affect other members.

<sup>147</sup> Australian Government Productivity Commission, *Economic Regulation of Airports, Draft Report* (February 2019), p 262.

<sup>148</sup> The Inquiry has also been advised that similar accession clauses to that in the JUHI agreement exist in relation to the JUHIs at other airports, including in Australia. We understand that Qantas successfully obtained access to the JUHI at Sydney Airport (which is restricted access). We also understand that other parties have tried to access restricted-access JUHIs at airports in Australia, but no other parties have been successful.

## 17 Alternative methods of supplying jet fuel to Auckland Airport

equity structures that charge a throughput fee (which provides the incumbent infrastructure owners with a fair rate of return).<sup>149</sup>

### **Lack of transparency around terms of access**

- 17.36 During the forum, Gull told the Inquiry that it needs to obtain access to the on-airport hydrant system to establish its proposed jet fuel supply chain. At present, access can only be obtained through the JUHI.
- 17.37 The JUHI joint venture participants have asserted confidentiality over the agreement that governs the existing JUHI. Gull told the Inquiry that it did not know what it needed to do to obtain access to the JUHI other than the first step, which was to obtain approval from Auckland Airport to supply jet fuel. It had no real idea of how long the process would take. We understand that Gull made an application to Auckland Airport for approval on 28 May 2019.
- 17.38 Gull provided us with an update on their progress in July 2019. They commented that that the entry process had become “frustratingly cumbersome” and a “chicken and egg” scenario. Specifically, Gull told us that the JUHI joint venture participants required Auckland Airport’s approval in order to provide the qualifying criteria; but Auckland Airport would not provide that approval until it had received certain information from Gull; which, according to Gull, could not be provided until it had seen the qualifying criteria.<sup>150</sup> After receiving a draft version of this report, the major fuel companies informed the Inquiry that they have agreed to share the qualifying criteria with Gull, despite it not having been granted approval by Auckland Airport.
- 17.39 As part of its Inquiry into the Economic Regulation of Airports, the Australian Productivity Commission received evidence on the lack of transparency around access terms to on-airport fuel infrastructure and the difficulties this can create. That evidence was similar to what we heard from Gull during the forum sessions. In its written submission, Qantas submitted:<sup>151</sup>

*At most airports in Australia new suppliers can only access on-airport fuel facilities via equity ownership. The process for equity access at a major airport JUHI is complex and time-consuming with little transparency.*

- 17.40 Similarly, Virgin Australia commented in its written submission:<sup>152</sup>

*Potential new jet fuel importers are faced with considerable uncertainty and risk about their ability to gain access to the jet fuel infrastructure supply chain. This uncertainty around obtaining secure and coordinated access to the jet fuel infrastructure supply chains is a clear deterrent to new market entrants and increased competition.*

### **Would open access to the JUHI remove these barriers?**

- 17.41 Some participants, as well as Fueltrac, recommended that the Inquiry consider whether open access to Wiri, the WAP, and/or the JUHI would enhance the resilience the Auckland jet fuel supply chain.

<sup>149</sup> In this regard, see the oral submission of BARA to the Australian Productivity Commission: Transcript of Proceedings (Sydney, 28 November 2018), p 14.

<sup>150</sup> Email from David Bodger to Inquiry secretariat (4 July 2019); Email from David Miller to Inquiry secretariat (8 July 2019). Auckland Airport said it had asked Gull to provide information that it needed to be able to assess Gull’s technical and management expertise, so that it could assure itself that the proposed operation would not create risks to Auckland Airport’s operations, the operations of other businesses, or the safety of workers, travellers, and members of the public.

<sup>151</sup> Qantas Group Submission on the Productivity Commission Inquiry into the Economic Regulation of Airports (September 2018), p 35.

<sup>152</sup> Submission by the Virgin Australia Group on the Productivity Commission Issues Paper (September 2018), p 27.

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This matter was an area of focus during the forum sessions and the Inquiry received oral and written submissions on it.

17.42 Open access refers to access arrangements for infrastructure where all the suppliers have equal rights to access the infrastructure through a fee-based, non-discriminatory pricing agreement with the owners or operators of the infrastructure.<sup>153</sup>

17.43 There are many ways open access can be facilitated:<sup>154</sup>

- by agreement between the owners and operators of a terminal, pipeline, or on-airport storage facility;
- by an airport requiring that open access be included as a condition of the ground lease for an on-airport storage facility;
- by an airport investing in the on-airport storage facility itself, and then reaching agreement with a third party to operate the on-airport storage on an open-access basis;
- by an airport reaching agreement with a third party to build, own, and operate on-airport storage on an open-access basis; or
- by government regulation.

17.44 We noted that, in Australia, both Darwin and Melbourne Airports have recently adopted open-access regimes for the JUHIs at those airports:

- At Melbourne, the airport made open access a condition of the ground lease for the JUHI.
- At Darwin, the airport has purchased a 40% stake in the joint venture on-airport storage and hydrant facilities and is buying out the other participants over the next 12 years. As part of this arrangement, Darwin Airport has made these facilities open access.

17.45 During the forum, participants variously submitted that:

- open access is not a resilience issue and is outside the scope of the Inquiry's Terms of Reference because access to Wiri, the WAP, and the JUHI was not a factor during the RAP outage;<sup>155</sup>
- any new entrant to the existing supply chain would introduce further complexity with respect to product quality, scheduling of batches, and decision making, which would decrease the resilience of the fuel supply chain;<sup>156</sup>
- the link between open access and resilience has not been demonstrated and is not guaranteed;<sup>157</sup>
- the existing access arrangements work effectively and enabled Caltex to join the WAP and the existing JUHI in the 1980s; and
- open access would create uncertainty and diminish the likelihood that the incumbent owners would invest in additional infrastructure.

17.46 The Inquiry considered these arguments carefully. We accept that open access does not guarantee additional resilience along the jet fuel supply chain. However, we were persuaded that it would have the effect of removing barriers to entry that make it difficult for new entrants to set up alternative jet

<sup>153</sup> Fueltrac report, p 4.

<sup>154</sup> Fueltrac report, pp 43–45.

<sup>155</sup> Z Energy Response to Minute No. 5: Forum Issues (received 24 May 2019), p. 12; Submission of BP Oil New Zealand Limited on the Forum Issues set out in the Inquiry's Minute No. 5 (27 May 2019), p 8.

<sup>156</sup> Z Energy Response to Minute No. 5: Forum Issues (received 24 May 2019), p 12.

<sup>157</sup> Mobil Oil New Zealand Ltd Letter to the Inquiry (11 June 2019), p 3.

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fuel supply chains. We think that open access helps to provide an opportunity for new entrants to invest in infrastructure that could potentially result in diversity of supply and therefore, it has the potential to enhance the resilience of the jet fuel supply chain. We note the following:

- Open access removes the perceived conflict of interest associated with BP, Mobil, and Z Energy, which are all sellers of jet fuel, controlling access to infrastructure that is necessary to enable other third-party suppliers to sell jet fuel to airlines.
- The RAP outage exposed that the jet fuel supply chain is vulnerable to single point of failure risk. One of the key lessons from the outage is that, for resilience purposes, it is desirable that Auckland has a second permanent fuel supply chain. This is especially true now that the primary back-up supply chain that was used during the 2017 is no longer a viable option.
- Gull's experience in trying to access the existing fuel infrastructure indicates that the requirements to obtain access are murky and cumbersome. A similar experience appears to have been shared by new-entrant jet fuel suppliers in Australia.
- Open access can help to remove the lack of transparency around access arrangements. For example, under the JUHI ground lease at Melbourne Airport, the JUHI joint venture participants are required to publish on their website information for applicants seeking access.<sup>158</sup>
- Open access, with payment of a throughput fee, presents a lower barrier to entry for new entrants in terms of start-up costs (as opposed to the requirement to purchase an equity share).
- Any complexity associated with enabling additional suppliers to use the WAP and the existing JUHI infrastructure appears to have been successfully negotiated when Caltex obtained access to these facilities.

### **Our findings on the possibility of an alternative method of supply for Auckland**

17.47 We have concluded that in principle, the most effective method of enhancing resilience for Auckland Airport's fuel supply would be the development of a permanent, second, independent jet fuel supply chain, if that was possible. We believe that a permanent supply chain is preferable to back-up arrangements that can only be used in the event of a disruption.

17.48 As noted earlier, several companies are considering the possibility of establishing a second supply chain for jet fuel. We do not have a view on whether any of the companies considering these possibilities, or others, will ultimately invest in them. Under the current industry settings, it is for the participants in the market to decide what is financially viable for them.

17.49 In our view, the access regimes at Wiri, the WAP, and the existing JUHI create barriers for new entrants to set up alternative methods of supply in the jet fuel market:

- The vertical integration of the jet fuel supply chain (where the owners of Wiri, the WAP, and the JUHI are the same companies that sell jet fuel to airlines), along with the ability for the incumbent joint venture owners to control access to that infrastructure, gives rise to a conflict of interest. There is a structural incentive for the incumbent joint venture participants to deny or inhibit access to new entrants that will compete with them for jet fuel customers.

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<sup>158</sup> While this information does not publish the qualifying criteria for access to the fuel facilities or the rules for their use, it does clarify that such information will be provided to an applicant (subject to a confidentiality agreement), once the JUHI operator is satisfied the application is genuine and the supplier is not the subject of international trade sanctions. The website information also provides clarity around other aspects of the application process and the decision-making process.

## 17 Alternative methods of supplying jet fuel to Auckland Airport

- The requirement that a new entrant purchase an equity share can create risk for potential new entrants that are in the early days of setting up a supply chain and still determining whether they can establish and grow a market (when compared with non-equity structures, which charge a throughput fee that provides the incumbent infrastructure owners with a fair rate of return).
- There is a lack of transparency around the decision-making processes for gaining access to Wiri, the WAP, and the JUHI.

17.50 The Inquiry considers that open access to the infrastructure in the supply chain would have the effect of removing barriers to entry that make it difficult for new entrants to set up alternative jet fuel supply chains. As a result, it has the potential to help enhance the resilience of the jet fuel supply chain.

### Summary of our findings

- A permanent, second, independent supply chain for jet fuel would significantly enhance the resilience of the system for supplying jet fuel to Auckland Airport.
- Some parties are considering possible new supply chain routes, but it will be for the market to determine whether that is financially viable.
- We think there are barriers to new entrants to the market as a result of:
  - the conflict of interest resulting from the incumbent joint venture participants deciding whether potential competitors can have access to the existing infrastructure;
  - the requirement to buy an equity share in the infrastructure; and
  - the lack of transparency regarding the access terms.
- Open access to infrastructure in the supply chain is likely to reduce the barriers to entry.

## 18 How to improve the resilience of the jet fuel infrastructure serving Auckland

### The problem with the current supply chain for jet fuel

- 18.1 It is in the public interest that the infrastructure that supplies jet fuel to Auckland Airport is resilient. It needs to:
- deal with acute shocks (for example, the sudden rupture of the RAP in 2017), as well as with more gradual stresses (for example, pressures from increasing demand for jet fuel);
  - be part of a system that learns from experience (for example, the vulnerability arising from a lack of diversity of supply highlighted by the RAP outage); and
  - provide a platform for the Auckland region to grow and thrive (for example, by ensuring that nationally important infrastructure, such as Auckland Airport, can continue to meet New Zealand's needs, both now and well into the future).
- 18.2 In this Part, the Inquiry has analysed the single jet fuel supply chain to Auckland Airport and found there is a risk of single point of failure along all parts of the supply chain to the Airport. The Inquiry subsequently concluded that the infrastructure making up this single supply chain is not sufficiently resilient. Its resilience is projected to decrease further in the light of forecast demand in both the short and medium term.<sup>159</sup> In addition, the supply chain is not well placed to manage another outage of any significant duration.
- 18.3 To recap:
- Refining NZ has a clear picture of the forecast increase in jet fuel demand at Auckland Airport and has a series of projects underway to ensure the RAP can meet the forecast increase in demand. If its planned improvements to the RAP capacity are implemented (that is, the introduction of a drag-reducing agent to ground fuels and an increase in the maximum operating pressure to 82 barg), Refining NZ is confident that the RAP has sufficient capacity to manage increasing demand through to 2030 and beyond.
  - The capacity of the infrastructure making up the rest of the supply chain (Wiri, the WAP, and the JUHI) can meet current jet fuel demand, but urgent investment is required if these pieces of infrastructure are to continue to cope with forecast demand across the next few years.
  - The target resilience standard for storage close to the airport is 10 days' cover at 80% of operations, based on the average of the 30 non-contiguous peak days in a calendar year (as explained in paragraphs 15.7–15.14). Combined storage at Wiri and the JUHI currently provides about six days' cover in an average month (the figure is lower in peak months). Accordingly, we concluded there is inadequate jet fuel storage at Wiri and the JUHI for resilience purposes. The level of cover will continue to decrease if no new tanks are built as the demand for jet fuel increases.
  - Input capacity to the JUHI should exceed 110% of peak days' demand.<sup>160</sup> At present, the WAP does not meet that target resilience standard without additional trucking. After 2024, the WAP will not be able to meet forecast peak demand even with trucking to supplement it.

<sup>159</sup> In carrying out our assessment, we focused on the forecasts of demand for fuel through until 2030. Although the forecasts we used look out to 2040 or more, we considered that the data became less reliable beyond about 2030.

<sup>160</sup> Again, calculated based on the average of the 30 non-contiguous peak days in a calendar year.

## 18 How to improve the resilience of the jet fuel infrastructure

- It is possible to make up some of the WAP's input capacity shortfall by trucking jet fuel from Wiri to the JUHI. However, traffic congestion issues and limited input capacity into the JUHI limit the use of trucking to relatively small quantities of fuel or to emergency situations.
  - The lead times for any significant investment in jet fuel infrastructure are long, given the complexity of the decision-making process within the relevant joint ventures and the scale of the construction projects involved.
  - Some parties are exploring the possibility of developing alternative supply routes, but this work is only in its preliminary stages.
- 18.4 Set against the forecast for steady growth in the demand for jet fuel, there is reason to be concerned. The Wiri terminal, the WAP, and the JUHI are already inadequate from a resilience perspective. Without investment in new and substantial infrastructure, there will be a continued steady decline in the resilience of the Auckland jet fuel supply chain.
- 18.5 In our view, the fuel companies have failed to make timely investment decisions to build needed additional infrastructure (as explained in paragraphs 16.9–16.19 and 16.24–16.30). For example, even if the joint venture participants were to make a commitment to invest in a second WAP by the end of 2019, the likely construction time (approximately four years, including obtaining consents) means that trucking between Wiri and the JUHI will be necessary in times of peak demand, to make up for the WAP capacity shortfall. This is not Auckland Airport's preference. We are not confident that the current trucking input capacity at the JUHI is adequate to meet this expected demand.
- 18.6 We found that the lack of investment is due to the following factors:
- unforeseen high growth in demand for jet fuel at Auckland Airport;
  - uncertainty about the location of the future JUHI and the timing of any move; and
  - the governance and decision-making structures within the joint ventures that own Wiri, the WAP, and the JUHI.
- 18.7 The first two of these factors should now be resolved
- As a result of the Inquiry's workshop and forum sessions, all relevant parties now have access to the same robust jet fuel demand forecast information. The parties all know the likely pace and scale of demand that they need to meet.
  - Auckland Airport has confirmed that it does not intend to terminate the lease for the current JUHI before it expires in 2035. The fuel companies should now be able to rely on this public assurance to make informed investment decisions.
- 18.8 The last factor, the governance and decision-making structures of the joint ventures, is an issue that only BP, Mobil, and Z Energy can resolve.
- 18.9 Against this background, we consider there to be a larger issue.
- 18.10 New Zealand's petroleum sector is a fully deregulated market (although the infrastructure we examined was originally built with some government support and at a time when there was extensive regulation). Deregulation in the 1980s has resulted in market forces being left to provide for resilience.
- 18.11 During the Inquiry, all three major fuel companies spoke of the need to do a cost-benefit analysis to determine whether to invest in specific fuel infrastructure projects. This was reiterated in their comments on the draft of this report:

## 18 How to improve the resilience of the jet fuel infrastructure

- Mobil told us:<sup>161</sup>

*...a detailed cost-benefit analysis is required to ensure that any capital investment does not result in redundancy in the supply chain, or significant financial burden to the end consumer without presenting material benefit.*

- BP told us:<sup>162</sup>

*...any assessment of resilience should not take place in a vacuum and instead should consider the cost/benefit of any resilience-enhancing options proposed measured against the probability of a future outage event.*

- Z Energy told us:<sup>163</sup>

*The report talks about the fact that there has been a lack of investment in infrastructure but does not acknowledge that a large part of the reason for this lack of investment is because the costs of investment have exceeded the benefits.*

18.12 Market Economics has observed that, in cost-benefit studies, uncertain benefits are often calculated simply as the monetary benefits under each contingency (in the case of extra tank storage, this would be the reduced monetary losses suffered in a fuel disruption event) multiplied by the probability of the disruption event occurring. The result is then compared with the costs of investment in that extra storage.<sup>164</sup> As we have already set out in chapter 3, Market Economics identify a problem with this approach in the case of high-impact, low-probability events:<sup>165</sup>

*...it does not account for people's risk aversion. There is ample evidence that in risky situations, many individuals will be willing to pay more than expected monetary benefits to avoid an adverse situation. The difference between the expected monetary benefits and willingness-to-pay is often termed the 'risk premium'.*

18.13 The current market model does not require private companies to take into account the public benefits associated with resilient fuel systems, by which we mean systems that survive, adapt, grow, and thrive in the face of acute shocks (such as the RAP outage) and chronic stresses (such as extended surges in jet fuel demand). While there are private benefits in ensuring that a fuel supply system is resilient, there is also a public good involved, which may require government intervention, should the market model fail to deliver a fuel supply system with an acceptable level of resilience.

18.14 At present, the three major fuel companies who own Wiri, the WAP, and the JUHI appear to be focused on meeting the demand curve, such that their investments are made just in time (or, as is the current situation, to catch up with the curve to meet a rapid increase in demand). Inadequate weight appears to be given to the public interest in ensuring that infrastructure is, and remains, resilient. Until we raised our proposed resilience measures with the fuel sector participants, we had not seen any evidence that they were considering the issue of resilience, in terms of minimum resilience standards, when making investment decisions.

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<sup>161</sup> Letter from Mobil to Inquiry Chair (26 July 2019).

<sup>162</sup> Letter from BP to Inquiry Chair (26 July 2019).

<sup>163</sup> Letter from Z Energy to Inquiry secretariat (29 July 2019).

<sup>164</sup> Market Economics, *Economics of Fuel Supply Disruptions and Mitigations* (Final Report, 24 May 2019), p 73.

<sup>165</sup> Market Economics, *Economics of Fuel Supply Disruptions and Mitigations* (Final Report, 24 May 2019), p 11. See also pp 73–74.

### The market should try to solve the problem

- 18.15 During the forum, we heard from the industry participants that their first preference was to let the market resolve the problem.
- 18.16 The Inquiry did not attempt to carry out a detailed cost-benefit analysis in relation to each of the specific investment options that we have heard of that are available to enhance the resilience of Auckland's fuel supply system. That is the task of the industry participants when they decide whether to invest in a particular project.
- 18.17 However, through its work, the Inquiry has identified a set of resilience standards, against which the fuel industry can now develop and implement its investment plans for fuel infrastructure. These resilience standards draw on the IATA Guidance, the experience of overseas airports, and Fueltrac's advice. We strongly encourage the industry to get on and do this. At the same time, they should ensure that Auckland Airport, airlines, and government agencies receive regular information about their investment plans.
- 18.18 Investment is urgently required. The long lead times for any significant investment in fuel infrastructure, coupled with the forecast steady decrease in the resilience of Auckland's jet fuel infrastructure, make it too risky for the Government (and other stakeholders) to simply maintain a watching brief and to consider stronger action only if inadequate progress is made. For this reason, we considered some other solutions available to the Government and key stakeholders to create and sustain a market environment that adequately factors the public benefit of having sufficiently resilient fuel infrastructure into investment decision making.

### What are the solutions?

- 18.19 The package of solutions that we have identified comprises:

- getting robust information and sharing it;
- recognising the role of Auckland Airport;
- close monitoring of progress by the Government; and
- regulatory and non-regulatory solutions if the market cannot deliver a solution on its own.

#### **(1) Get robust information and share it**

- 18.20 Good information is the basis for sound decision making. Yet even getting robust information on the capacity of the current supply chain and its components has been challenging. We have been told that getting solidly based and shared forecasts has also been difficult in the past.
- 18.21 The information does exist. The parties agreed to share the most recent forecast information with the group that attended the closed workshop that we held. However, they have been reluctant to share that type of information regularly or more widely. In our view, this is unfortunate. The various parties all need to be able to work from robust information and there is substantial benefit in them having a shared view on the forecasts.
- 18.22 We have already explained that Auckland Airport and BARNZ commissioned Hale & Twomey to prepare forecasts last year. All parties now agree that these forecasts provide the best information available and should provide the basis for future planning. We see it is a positive step that these forecasts have been created, shared, and agreed.
- 18.23 In our view, Auckland Airport should now establish and maintain a system for updating and sharing these forecasts on a regular basis with all the parties who have a role or interest in the resilience of the airport's jet fuel supply. Auckland Airport has told us that it agrees and has already given updated

## 18 How to improve the resilience of the jet fuel infrastructure

information on its passenger number forecast to Hale & Twomey, who will use it to refresh the jet fuel demand forecast.

- 18.24 The Inquiry was told about other airports (for example, Brisbane Airport) where the airport, fuel companies, and airlines all meet regularly to discuss forecasts and infrastructure issues.<sup>166</sup> These coordination forums aim to ensure coordinated discussion to keep planning and investment on track against forecasts and to make sure that the plans of the different parties align rather than conflict. The draft report of the Australian Productivity Commission suggested that this type of forum should be the norm for major airports.<sup>167</sup>
- 18.25 We regard this as a mature approach to ensuring that an airport maintains a good level of resilience. In our view, Auckland Airport should take the lead and adopt this model, and establish a permanent forum to discuss the resilience of jet fuel supply. In particular, we recommend that such a forum should discuss:
- capacity constraints and potential pressure points;
  - linkages between different infrastructure elements;
  - demand forecasts;
  - security of supply against agreed measures; and
  - future infrastructure requirements and investment planning.
- 18.26 Establishing such a forum would provide a good platform for the market participants to start to make progress in tackling the resilience challenges we have identified. We acknowledge that Auckland Airport has set up a Jet Fuel Industry Working Group, which is a technical working group that is considering some of these issues with BARNZ, Air New Zealand, and the three major fuel companies. Auckland Airport has told us that it will ask the members of that Group to broaden its terms of reference in line with our recommendation.

### **(2) Auckland Airport has a role**

- 18.27 In addition, Auckland Airport has levers to encourage the parties to make progress. The current and future JUHI are both important parts of the picture. The airport has already helped to remove one blockage by confirming that it has no plans to terminate the lease for the current JUHI before its expiry date. This means that the JUHI participants should be able to invest in new tanks there with reasonable certainty that they will be able to get an appropriate return on that investment.
- 18.28 We also encourage Auckland Airport to consider carefully how it might approach the question of the management of the future JUHI that is to be built at a new location. From our discussions with officials from Melbourne Airport, and commentators in the jet fuel sector in Australia, it appears that a new generation of JUHI arrangements is being developed, which is considerably more sophisticated than the types of arrangements that were entered into two to three decades ago. Chapters 16 and 17 discussed the sorts of new arrangements that are being tried in Australia in (such as open access to

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<sup>166</sup> The head lease to the JUHI at Brisbane Airport requires Brisbane Airport and the owners of its JUHI to use reasonable endeavours to work together, in good faith, in a constructive and collaborative manner, in relation to each other's planning requirements for the airport. Specifically, the lease contemplates regular management and operational meetings that discuss matters such as (1) each party's planning requirements for the airport; (2) the airport's requirements overall for aircraft refuelling infrastructure; (3) the required timing for delivery of the required infrastructure; and (4) how each party might be able to support the other with the delivery of their respective infrastructure requirements. See Brisbane Airport's response to the Australian Productivity Commission's *Economic Regulation of Airports, Draft Report* (25 March 2019), p 20 (accessible at: <https://www.pc.gov.au>).

<sup>167</sup> Australian Government Productivity Commission, *Economic Regulation of Airports, Draft Report* (February 2019), pp 268–269.

## 18 How to improve the resilience of the jet fuel infrastructure

JUHI infrastructure, as well as the use of ground leases to ensure minimum standards for on-airport storage capacity and input capacity into the JUHI). A further option is for Auckland Airport to consider tendering out the construction, ownership, and/or operation of the future JUHI, to enable consideration of an independent third-party owner or operator.<sup>168</sup>

- 18.29 It is also important that the final decision about the new JUHI's location should take into account resilience considerations, including the ability to supply jet fuel to the Airport via a permanent second supply chain. The new JUHI should be located in an area that does not limit the options for fuel supply, whether that be via pipeline, truck, train, or another method.
- 18.30 The developments in Australia are still relatively new. However, we encourage Auckland Airport to stay in touch with its counterparts in Australia and further afield, and to monitor their experiences. It should use that information to inform the way it goes about establishing the future JUHI, once a decision has been made on its location. Auckland Airport told us that it intends to learn from the experience of others.

### **(3) The Government should closely monitor and review progress**

- 18.31 It will be important for the Government to monitor the situation closely to assess whether sufficient progress is being made. It will need to check on investment plans for the Wiri terminal, the WAP, and the JUHI, as well as any new supply chain. It should also seek updates on how jet fuel demand is tracking against the resilience measures that we have set out in this report relating to storage capacity at or near Auckland Airport and the input capacity for the JUHI. In our view, this information should be collected on a regular basis (at least every six months) and should be published, or at least shared with the parties with an interest (in particular, Auckland Airport and the airlines).
- 18.32 Within government, we would like to see the issue considered as a question of the resilience of critical infrastructure and fuel security, rather than simply as a question about the operation of the market in the petroleum sector. If the resilience of the infrastructure that makes up this supply chain fails, it will have a knock-on effect for Auckland Airport, which is itself nationally significant infrastructure.
- 18.33 We recommend that MBIE work closely with the Infrastructure Unit within the Treasury and the associated advisory bodies, as well as with the new Infrastructure Commission once it is established. We think the issue of the jet fuel supply chain serving Auckland should be on the risk radar of all of these agencies.
- 18.34 The Commerce Commission is due to release the final report from its market study into retail fuel at the end of 2019. Their report might raise similar issues about access to key infrastructure and whether there is a problem with achieving timely investment in new infrastructure. The Government should consider this Inquiry's work and recommendations alongside the Commerce Commission's report.

### **(4) Other steps the Government can take**

- 18.35 Government intervention may be required if the market is unable to deliver a solution on its own to provide the required level of resilience. The options for government intervention include:
- using its influence to work with the parties to facilitate a resolution, producing an agreement and timely action. The most recent example in this context is provided by Melbourne Airport;
  - developing options for more tangible incentives or support arrangements that might help the parties to find a way to make the needed investment in this nationally significant infrastructure.

<sup>168</sup> For example, one of the larger independent service providers, Skytanking, reportedly manages the operation of more than 30 on-airport aviation fuel storage and hydrant systems worldwide ([www.skytanking.com/en/home.html](http://www.skytanking.com/en/home.html)).

## 18 How to improve the resilience of the jet fuel infrastructure

These options could range from support through an investment fund or other funding vehicle, development levy,<sup>169</sup> or assistance with debt financing or other funding mechanisms, through to the Government itself investing or even providing grant funding;<sup>170</sup>

- developing and enacting legislation to put in place a menu of regulatory options that enable the Government to step in when industry cannot find appropriate solutions by itself. There are several examples of legislation of this kind in the New Zealand statute book, including the regulatory options in the Commerce Act 1986 for airports and the provisions in the Gas Act 1992, which regulate the gas industry.

18.36 We have already explained that:

- investment in infrastructure is urgently required to meet demand;
- building significant jet fuel infrastructure (such as tanks) takes several years;
- no definitive commitment to invest in a specific project that will adequately enhance the resilience of the jet fuel supply chain has been forthcoming from the three major fuel companies; and
- Auckland's jet fuel infrastructure will continue to steadily decrease in resilience as we wait for investment decisions to be made.

18.37 For these reasons, we recommend that the Government take steps now to put in place the regulatory tools it might need for a more active response to these resilience issues, should industry fail to make adequate progress in the short term. In this regard, we note the observation of the Gas Industry Company Ltd (the co-regulator of the gas industry):<sup>171</sup>

*...reliance on private sector investment raises the importance of having a clear and practical path of such investment and a regulatory regime that takes account of 'public benefit'.*

18.38 If the Government were to develop legislation to regulate the sector to improve investment, it would again have several options:

- Legislation could require compulsory disclosure of information on a regular basis, including usage, forecasts, capacity, and investment plans. This type of requirement would force some transparency onto the sector, so that it was clear to its customers and others affected by the supply chain how well the infrastructure was being maintained and developed. Again, there are several examples in New Zealand law of compulsory disclosure regimes designed to put some discipline on the participants in the relevant market.
- Legislation could set some performance standards that infrastructure providers would have to meet. The obvious examples in this context are the measures that we have been using in this report (days of cover provided by storage facilities and the input capacity at the JUHI). There are choices about where the obligation would sit: it could be placed on Auckland Airport, which would then pass it on to the operators or owners of the relevant infrastructure through leases or other commercial arrangements, or it could be placed directly on the owners or operators of the infrastructure. There would also be questions about the timing for any such obligation applying and the length of lead time that would be allowed to enable an operator to become compliant. The

<sup>169</sup> For example, between 1990 and 2012, a departure tax was levied on passengers using Palmerston North Airport, to pay for development at the airport, including a terminal rebuild.

<sup>170</sup> See, for example, the work of Crown Infrastructure Partners (previously Crown Fibre Holdings).

<sup>171</sup> Gas Industry Company Limited, *The New Zealand Gas Story: the state and performance of the New Zealand gas industry* (6th edition, December 2017), p 25.

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advantage of this option is that it sets the desired minimum standards, but does not dictate to the market how it should organise to meet it.

- Legislation could also be used to require open access to relevant infrastructure, such as storage facilities and pipelines. The advantage of this option is that it would both improve transparency and remove a barrier to investment for new entrants looking to establish an alternative supply chain. It therefore might help to create an environment in which the market could find its way to making the needed investment. Current commercial arrangements would need to adapt.
- Legislation could establish a co-regulatory model for governance (such as the model that exists under the Gas Act 1992 in relation to the New Zealand gas industry), where an industry body (that is broadly inclusive of industry participants) may recommend governance regulations to achieve certain prescribed objectives, such as the facilitation and promotion of a resilient fuel supply system. The advantage of this model is that it encourages the delivery of industry-led solutions for industry reform where practicable, and the recommendation of regulatory arrangements where appropriate. There are also tools available to the Minister to step in to counter any hold-out behaviour, or any inability on the part of the industry participants to reach appropriate arrangements.<sup>172</sup>

18.39 All of these options have advantages and disadvantages. And they are not mutually exclusive; it would be possible for the Government to pursue several of them at the same time.

### Our preferred approach

18.40 In our view, the following combination of steps for the Government is likely to be effective in promoting change and encouraging the parties to find ways to invest in infrastructure that is sufficiently resilient:

- Develop enabling legislation that gives the Government the power to step in if the fuel industry proves unable to adequately address the public interest in resilience when making investment decisions on fuel infrastructure.
- At the same time, the Government should closely monitor the fuel industry's progress towards finding solutions and making the necessary investments.
- If the market participants are unable to make sufficient progress on their own, the Government should consider how it might facilitate a resolution. Options might include discussion of government help in finding an investment vehicle, suitable funding arrangements, or similar support.
- If the market still does not find a solution, even with government facilitation, then it is likely that the Government will need to use the proposed legislative powers to step in to impose an outcome.

18.41 As noted above, the enabling legislation that we propose could provide for different levels of government intervention. Depending on the circumstances, a regime requiring compulsory disclosure of information (such as usage, forecasts, capacity, and investment plans) may be sufficient. However, it may be necessary for the Government to consider a stronger regulatory intervention, such as the setting of minimum capacity and/or storage standards, or regulating for open access to key infrastructure.

<sup>172</sup> Gas Industry Company Limited, *The New Zealand Gas Story: the state and performance of the New Zealand gas industry* (6th edition, December 2017), p 32.

### Our recommendations

The following recommendations are designed to create an environment in which the participants in the market for supplying jet fuel are more likely to reach decisions to invest in the infrastructure that creates and maintains a sufficiently resilient jet fuel supply chain.

We recommend:

#### **Recommendation 15: Auckland Airport updates demand forecasts and shares them**

That Auckland Airport establish a system to have its demand forecasts regularly updated and to share them with the fuel suppliers, airlines, officials, and other interested parties.

#### **Recommendation 16: Auckland Airport convenes a jet fuel supply coordination forum**

That, having regard to the findings in this report, Auckland Airport convene a jet fuel supply coordination forum, similar to the one operating at Brisbane Airport, to share information on capacity constraints and pressure points, demand forecasts, linkages, security of supply, and investment plans.

#### **Recommendation 17: Auckland Airport takes into account resilience when planning the new JUHI**

That Auckland Airport monitor the developments taking place in Australia and overseas on how JUHI infrastructure is being built, owned, and operated. This should help to inform the airport on the question of the way the future JUHI should be structured, including whether the future JUHI should be operated on an open-access basis; whether there should be minimum standards for storage and input supply capacity stipulated in the ground lease; and whether the JUHI operator should have to disclose and consult over its future investment plans on a regular basis.

The final decision about the location of the new JUHI should take into account resilience considerations, including that its location does not limit the options for fuel supply via pipeline, truck, train, or another method.

#### **Recommendation 18: The fuel sector commits to building new infrastructure**

That the fuel sector make investment decisions without delay in order to enable work to start on the building of new infrastructure that takes into account the resilience-enhancing measures articulated in this report, including:

- diversity of supply;
- storage at or near Auckland Airport that provides at least 10 days' cover at 80% of operations, based on the average of the 30 non-contiguous peak days in a calendar year; and
- input capacity into the JUHI that exceeds 110% of peak days' demand.

The fuel sector should provide information on progress towards these decisions to all those with an interest (in particular, Auckland Airport, the airlines, and the Government).

#### **Recommendation 19: The Government legislates to put regulatory options in place**

That the Government begin work immediately to develop and enact new legislation to put in place regulatory options that would enable it to step in should the fuel sector not be able to adequately take into account the public interest in resilience when making investment decisions relating to fuel infrastructure.

## 18 How to improve the resilience of the jet fuel infrastructure

### **Recommendation 20: The Government monitors progress and helps facilitate a solution if possible**

That the Government:

- monitor progress on the matters identified in this report on a quarterly basis, including monitoring jet fuel demand against the Inquiry's resilience standards and the plans for investment in fuel infrastructure, and consider that information together with the final report from the Commerce Commission's study of the retail fuel sector; and
- consider what support it might be able to offer to facilitate an outcome if the sector has not made sufficient progress on advancing investment without delay.

### **Recommendation 21: The Government intervenes, if the sector does not make progress**

That, if the sector has not been able to make the necessary progress by 30 June 2020 by committing to the investment needed to bring this infrastructure up to the recommended resilience standards (for example, by making definite decisions to commit capital to relevant construction projects), the Government should take steps to intervene, using the statutory powers we have recommended.

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## Appendices

### Appendix A: Terms of reference for the Inquiry

#### Background and Matter of Public Importance

The Refinery to Auckland Pipeline (RAP) was shut down for 10 days following the discovery of a leak on 14 September 2017. The RAP is a 170 kilometre buried pipeline running from the Marsden Point Refinery to a bulk oil storage terminal at Wiri in South Auckland. The RAP supplies most of the Auckland region's fuel, including all of its jet fuel. Jet fuel is supplied from the Wiri terminal to Auckland Airport via a second pipeline, which remained operational.

The main impact of the RAP outage was the rationing of jet fuel supplied to Auckland Airport over a 12-day period in September 2017. The affected airlines activated their contingency plans to operate under fuel rationing, which included rationalising flights, up-gauging aircraft for some flights (i.e., swapping smaller aircraft for larger ones), and arranging technical stopovers on long haul flights to allow for refuelling. It was estimated that at least three per cent of the scheduled domestic and international flights were cancelled at Auckland Airport during the period[1].

The RAP outage also affected the supply of ground fuels, causing intermittent outages of some products (mainly premium petrol) at a small number of service stations around Auckland.

During the RAP outage, the Government activated elements of its emergency response plans to facilitate the flow of information to interested parties and to help the fuel industry and airlines manage the effects of the outage. For example, there was temporary permission for heavier loading of road tankers on routes from Tauranga and Marsden Point.

Following the RAP outage, Refining NZ, which owns and operates the RAP, reported that it spent \$6 million repairing the pipeline, and lost \$6.3 million in processing fees and a further \$2 million in distribution fees attributable to the disruption to supply. Refining NZ received a pay-out of \$2.9 million from insurers to cover environmental damage resulting from the pipeline leak[2]. Z Energy (one of the three affected fuel suppliers) reportedly lost \$5 million as a result of the RAP outage[3].

The RAP outage and its impact on fuel users is a matter of public importance.

#### Northland Regional Council's investigation into the fuel leak

The Northland Regional Council is responsible for monitoring and enforcing the Resource Management Act (RMA) provisions relating to the operation of the RAP in Northland, including at the rupture site in Ruakaka. In February 2018 the Council concluded its investigation into the unauthorised discharge of fuel from the RAP into the environment in September 2017. This investigation focused on:

- whether Refining NZ's maintenance and operating practices were contributing factors to the leak;
- the involvement of any third parties in the leak; and
- Refining NZ's response to the spill, including efforts to contain the discharge and to remediate the affected land.

The Northland Regional Council found that it does not have a case to prosecute anyone for the fuel leak because "while gouges apparently caused by a digger were believed to have triggered the RAP outage, the actual date of the damage and its specific cause were not known". The discharge was attributable to "a particular and unique set of circumstances which could not reasonably have been foreseen or provided against" and "the effects from the discharge had been adequately mitigated and remedied"[4].

The Northland Regional Council did not consider the impact of the fuel supply disruption, government oversight of fuel security, and how well other parties besides Refining NZ responded to the fuel leak.

### Regulation and oversight

Refining NZ is responsible for the safety and integrity of the fuel pipeline and associated equipment that it owns and operates. Under the Health and Safety in Employment (Pipelines) Regulations 1999, all pipelines, including the RAP, must be operated with a current certificate of fitness issued by an inspection body recognised by WorkSafe New Zealand, the agency enforcing the regulations. The certificate of fitness verifies that the pipeline and all equipment necessary for the safe operation of the pipeline comply with the standard or code to which the pipeline was designed, constructed, operated and maintained.

The Government has an oversight role to ensure that fuel supply is reliable and secure in New Zealand, including in relation to emergency response management. The Government's Oil Emergency Response Strategy sets out the broad policy and operational aspects that underpin the Government's response to a significant disruption of oil supplies. The strategy focuses principally on international disruptions to oil supplies or disruptions that require a national response. National and regional Civil Defence Emergency Management fuel plans also play an important role.

The Government reviewed fuel security most recently in 2012. The 2012 review found that the fuel supply network in New Zealand is reasonably robust, the oil supply industry is adept at responding to most supply disruptions and the Government has processes in place to manage severe disruption events.

### Purpose and scope of recommendations

The RAP outage highlighted that fuel supply can be vulnerable to disruptions, and that effective risk management practices and contingency plans need to be in place to minimise the risk and impact of disruptions. The purpose of this Inquiry is to draw lessons from the RAP outage to inform how the fuel industry and the Government could improve the resilience of fuel supply in the Auckland region.

To do this, the Inquiry will:

- inquire into the cause(s), contributory factor(s) and impacts of the RAP outage, the operational responses to the outage, and the relevant operational and risk management practices of Refining NZ, fuel suppliers, airlines, national and regional civil defence emergency management organisations, and any other relevant parties; and
- taking into account the factors contributing to the RAP outage and its impact, report and make any recommendations it sees fit regarding the resilience of fuel supply in the Auckland region, and any other relevant matters.

### Exclusions from Inquiry

The Inquiry is not to inquire into, determine, or report on whether issues of criminal or civil liability arise.

### Related work

The Inquiry may take account of the outcome of any other relevant studies or investigations but is not bound in any way by the conclusions or recommendations of such studies or investigations. Studies and investigations deemed relevant to the Inquiry include but are not limited to:

- a. The Northland Regional Council's recent investigation into the fuel leak[5];
- b. New Zealand Petroleum Supply Security 2017 Update[6], which was published by the Ministry of Business, Innovation and Employment (MBIE) in September 2017; and
- c. any other fuel security studies commissioned by interested parties that may be completed before or during the course of the Inquiry.

### Definitions

"Fuel" means liquid petroleum fuels, including diesel, gasoline and jet fuel.

## Appendix A: Terms of reference for the Inquiry

“Fuel supply system” means the infrastructure and practices associated with the supply of fuel in New Zealand.

“Practices” includes, without limitation, each of the following: decision-making, procedures, processes, services, and systems.

### Report back

The Inquiry is to report its findings and opinions, together with recommendations, to the Minister of Energy and Resources in writing no later than six months from the establishment of the Inquiry. In order to ensure the Minister is kept appropriately informed as to progress, the Chair will provide regular updates to the Minister on the Inquiry’s progress throughout the course of the Inquiry.

If the Inquiry identifies issues which may affect its ability to deliver a final report by six months from the establishment of the Inquiry, it shall notify the responsible Minister as soon as possible with a view to identifying an appropriate solution, which may include (but is not limited to) an extension of time.

### Consideration of Evidence

The Inquiry may begin considering evidence on and from 10 December 2018.

Dated at Wellington this 6th day of December 2018.

HON DR MEGAN WOODS, Minister of Energy and Resources.

[1] Auckland Airport, September 2017 Monthly traffic update, 27 October 2017. Retrieved from [https://corporate.aucklandairport.co.nz/~/\\_media/Files/Corporate/Monthly\\_Traffic\\_Reports/2017/Monthly-Traffic-Update-September-2017.ashx?la=en](https://corporate.aucklandairport.co.nz/~/_media/Files/Corporate/Monthly_Traffic_Reports/2017/Monthly-Traffic-Update-September-2017.ashx?la=en)

[2] New Zealand Herald, *NZ Refining profit jumps 66 per cent despite \$14.3 million repair costs for pipeline rupture*, 28 February 2018. Retrieved from [https://www.nzherald.co.nz/business/news/article.cfm?c\\_id=3&objectid=12003417](https://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=12003417)

[3] Z Energy, *Z Energy operational data for quarter ended December 2017*, 23 January 2018. Retrieved from <https://investor-centre.z.co.nz/investor-centre/assets/Uploads/QOD-Dec-17-and-guidance-revision.pdf>

[4] Northland Regional Council, *No prosecution over refinery pipeline leak*, February 2018. Retrieved from <https://www.nrc.govt.nz/news/2018/february/no-prosecution-over-refinery-pipeline-leak/>

[5] <https://www.nrc.govt.nz/news/2018/february/no-prosecution-over-refinery-pipeline-leak/>

[6] <http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-security/oil-security/documents-library/petroleum-supply-security-september-2017.pdf>

### Amendment to the Notice for the Establishment of the Government Inquiry into the Auckland Fuel Supply Disruption

Pursuant to section 7(5) of the Inquiries Act 2013, and as the appointing Minister for the Inquiry, the Minister of Energy and Resources amends the final reporting date in the notice titled Establishment of the Government Inquiry into the Auckland Fuel Supply Disruption, published in the New Zealand Gazette, 7 December 2018, Notice No. 2018-go6197. The final reporting date is extended to 19 August 2019.

Accordingly, the paragraphs under the section titled “Report Back” will be removed and replaced with:

The Inquiry is to report its findings and opinions, together with recommendations, to the Minister of Energy and Resources in writing no later than 19 August 2019. In order to ensure the Minister is kept appropriately informed as to progress, the Chair will provide regular updates to the Minister on the Inquiry’s progress throughout the course of the Inquiry.

If the Inquiry identifies issues which may affect its ability to deliver a final report by 19 August 2019, it shall notify the responsible Minister as soon as possible with a view to identifying an appropriate solution, which may include (but is not limited to) an extension of time.”

Dated at Wellington this 17th day of April 2019.

HON DR MEGAN WOODS, Minister of Energy and Resources.

## Appendix B: The Inquiry's process

### The Inquiry team

Inquiry panel: Elena Trout (chair), Dr Roger Blakeley (member)

Secretariat: Nicola White (manager), Kirsty Pringle (administrator)

Counsel Assisting: Philp Skelton QC, Tom McKenzie

Consultant advisers: Michael Groesz and Bronwyn Buck, Fueltrac Pty Ltd

Contractors: Danielle Kelly (barrister), Veritas Investigations Ltd (private investigators), LUC Design Ltd (graphic designers), Clear Edit NZ Ltd (copy editors)

### Overview of the Inquiry's process

Timing (2019)	Key steps
14 February	Minute 1 released: Procedural matters, proposed list of core participants; proposed list of issues
February-March	Introductory meetings with parties
6 March	Minute 2 released: Final list of issues, designation of core participants, Inquiry procedure
Throughout April	Formal requests for documents and information under the Inquiries Act 2013 sent to parties
April-May	Formal interviews with parties
15 April	Minute 3 released: Appointment of independent experts to assist the Inquiry, timing and procedure for the Forum
3 May	Minute 4 released: Amended timetable and procedural directions for the Forum
13 May	Minute 5 released: List of issues for consideration at the Forum
27 May	Order made under section 15 of the Inquiries Act 2013 to keep the papers and proceedings of the 30 May Workshop confidential
29 May	Minute 6 released: Procedural matters for the Forum
30 May	Workshop on resilience questions (closed session)
31 May	Forum submissions published on Inquiry website
4 June	Forum Day 1: Causes of the outage, impacts and response
6 June	Forum Day 2: Resilience and security of fuel supply to Auckland
7 June	Forum Day 3: Resilience and security of fuel supply to Auckland
17 June	Meetings in Canberra with Australian government agencies
2 July	Supplementary information requests to some parties
19-26 July	Extracts of draft report provided to parties for feedback
6 & 15 August	Final Section 15 orders made to protect confidential information
19 August	Report delivered to the Minister of Energy and Resources

## Appendix B: The Inquiry's process

### Meetings

The Inquiry met with the following organisations and individuals between February and August 2019:

Air New Zealand Ltd	Lynton McMullen
Auckland Council	Melbourne Tullamarine Airport
Auckland International Airport Ltd	Ministry of Business, Innovation and Employment
Board of Airline Representatives New Zealand	Ministry of Civil Defence and Emergency Management
BP Oil NZ Ltd	Ministry of Transport
Commerce Commission	Mobil Oil NZ Ltd
Department of the Environment & Energy (Australia)	Northland Regional Council
Department of Infrastructure, Transport, Regional Development and Cities (Australia)	Productivity Commission (Australia)
First Gas Ltd	Refining NZ Ltd
First Union	Stolthaven Ltd
Gull NZ Ltd	Wiri Oil Services Ltd
Hale & Twomey	Z Energy Ltd

### Workshop and Forum

The following organisations took part in the Inquiry's closed Workshop and public Forum:

Organisation	Workshop (30 May 2019)	Forum (4,6,7 June 2019)
Air New Zealand	√	√
Auckland Council		√
Auckland International Airport Ltd	√	√
BARNZ	√	√
BP Oil	√	√
First Gas Ltd		√
Gull NZ	√	√
Hale & Twomey		√
Mobil	√	
MBIE	√	√
Qantas	√	
Refining NZ	√	√
Wiri Oil Services Ltd	√	
Z Energy Ltd	√	√

### Appendix C: Legislation relevant to the fuel sector

There are two Acts specific to the petroleum industry in New Zealand: the International Energy Agreement Act 1976 (IEA Act) and the Petroleum Demand Restraint Act 1981. Both date from the oil shocks of the 1970s and the significant international and domestic responses to them. Essentially, they are about how to ration fuel in a crisis.

#### International Energy Agreement Act 1976

The IEA Act sets up the systems needed to give effect to New Zealand's obligations under the International Energy Agreement. It gives the government the power to declare a petroleum emergency if there is a reduction in petroleum supplies. That then triggers a range of coercive powers, including the power to make regulations controlling all aspects of the production, supply, and use of petroleum.

The IEA Act also includes a ministerial power to direct the industry to provide regular information to enable the government to meet its obligations under the Agreement to supply information to the International Energy Agency. Under the Agreement, New Zealand must provide information on:

- general matters relating to the activities of oil companies operating in its jurisdiction (including details about their structure and finances, rates of production and access to the local crude oil, how supplies are being allocated, stocks, costs of crude oil and refined products); and
- specific matters relevant to managing an emergency (including oil consumption and supply, levels of emergency reserves, available transport facilities).

The Agreement also requires the government to maintain a permanent framework for consulting with fuel companies, but this has not been included as a legal obligation in the Act. In practice, the Ministry of Business, Innovation and Employment (MBIE) stays in touch with the companies operating in New Zealand and collects the data needed for reporting to the IEA from them.

#### Petroleum Demand Restraint Act 1981

The Petroleum Demand Restraint Act 1981 was passed after the 1979 oil crisis. New Zealand had already experimented with various rationing mechanisms (for example, carless days, closing petrol stations at weekends, lower speed limits) but these had not been very effective. This legislation was enacted to enable a more coherent rationing system to be put in place if it was ever needed. Like the IEA Act, it gives the government power to make regulations controlling the supply and use of petroleum if oil stocks are low. However, it is not linked to the IEA system.

#### Commerce Act 1986

In the absence of any sector-specific controls, the Commerce Act 1986 provides the main control on the activities of the fuel companies. This Act prohibits contracts, arrangements, or understandings that have the purpose or effect of:

- substantially lessening competition in a market; and
- fixing prices, controlling supply, or allocating market share between participants in a market.

It also prevents a party from taking advantage of their market power to restrict entry to the market and prohibits resale price maintenance (controlling the price at which a supplier's goods are on-sold).

## Appendix D: Chronology

### THURSDAY 14 September

- 9:54am A false fire alarm shut the RAP down. It was restarted soon after.
- 11:56am A loss of pressure tripped pumps, fuel stopped flowing in RAP.
- 2:40pm Site of leak discovered by helicopter.
- ~3:10pm Sandbags, booms, and gully suckers sent to the site. Crew worked to contain spill. Emergency services and NRC were informed of leak.
- 3:22pm Refining NZ phoned Minister of Energy and Resources to report leak. Informed MBIE that they had detected a loss of pressure, the issue was a 'pinprick' leak, with an estimated repair time of 24–48 hours. Key contacts within MBIE informed.
- 3:30pm Fuel company supply managers advised of a leak.
- 7:39pm Refining NZ posted on Facebook: *"an early estimate is that [the] pipeline will be out for the next two days."*

### FRIDAY 15 September

- 8:00am Repair team focused on building safe, stable work sites and removing water from onwads leak area so pipe could be examined.
- 11:00am Refining NZ teleconference with Supply Managers noted (and recorded in subsequent minutes) they were expecting visual inspection by 10:00am Saturday morning and until *"visual inspection occurs will not know full requirements of repair scope"*. If the leak was a pinhole they would clamp (expected timing 48 hours from 16 September). If it was a larger leak, a cut and re-weld would be required, expected repair time up to 1 week (worst-case scenario).
- Unspecified BP, Mobil, Z Energy decided to ration fuel use at Auckland Airport to 90%, effective midday Saturday 16 September.
- 3:30pm MBIE notified MCDEM.
- 4:30pm Air New Zealand decided to maximise tanker jet fuel into Auckland on domestic jets; and tanker to maximum landing weight on large aircraft flying from eastern Australian ports.
- 6:00pm Repair team exposed gouged section of the pipeline and concluded it unlikely that clamping was a viable repair option.
- 6:33pm Refining NZ advised their board, including fuel company representatives, that the leak was *"sizeable and needing a longer period to repair"* and that customers *"will need to ration fuels quite seriously"*.
- 6:50pm Fuel company supply managers were advised: *"unfortunately this damage is more extensive than anticipated. It is not a pinhole"* and *"the repair time is unknown but initial guesstimates are that it will be at least 1 week"*.

### SATURDAY 16 September

- 10:00am Refining NZ teleconference with supply managers confirmed the leak was larger than a pinhole, estimated timeline for repair 10–14 days from 16 September.

## Appendix D: Chronology

- 11:53am Refining NZ informed MBIE that the failure was more significant than initially assessed (revised repair estimate 10–14 days). MBIE informed DPMC, senior officials and Ministers.
- Unspecified Repair team focused on removing water around site.
- 1:22pm Air New Zealand established additional tankering from Pacific islands and any flights that could carry extra fuel. All tankering out of Auckland stopped.
- 3:12pm NOC communication issued recording: rationing fuel at Auckland Airport to 30% of usual fuel consumption effective immediately (30% to be met over 5 days).
- 5:00pm Repair team concluded that welding a new section of pipe was the best repair option.
- Unspecified Refining NZ began building and trialling a temporary jet fuel truck-loading facility at Marsden Point.
- 7:00pm DPMC activated the National Security System. Teleconference between Minister of Energy and Resources, Minister of Finance, PM's Chief of Staff, and officials from Energy and Resources branch of MBIE. Agreed that Minister of Energy and Resources would assume the role of lead Minister.
- 8:00pm DPMC convened a teleconference Watch Group including representatives from MBIE, MoT, DPMC, MCDEM, and NZ Police.

### **SUNDAY 17 September**

- Unspecified Refining NZ notified NZX that the RAP had suffered a leak, initially expecting it could be repaired within two days, but closer inspection showed the damaged section needed to be replaced. The pipeline would run at reduced capacity after repair (published 18 September).
- Unspecified Repair work began with three excavations: one around the damaged section, one to the north, and one to the south, to isolate the damaged section. Repair work continued for several days, including excavation and decontamination around stopple areas and repair area, and testing and transporting replacement pipe.
- 10:00am Teleconference between MBIE, MoT, MCDEM, Waikato Emergency Management, Auckland CDEM, Refining NZ, customers of Refining NZ, AIAL, and airlines.
- 11:30am ODESC meeting held. MBIE decided to use the NCMC from 6:00am Monday 18 September to facilitate coordinated multi-agency response.
- 9:18pm MBIE advised Refining NZ it was the single, central point of contact for all government agencies.

### **MONDAY 18 September**

- 6:00am NCMC activated, led by MBIE. Included officials from MBIE, MCDEM, MoT, NZDF, MoH; communications with Auckland Council, Auckland CDEM, NRC, MfE, NZTA, Immigration NZ, Tourism NZ, MFAT, and NZ Customs Service.
- Unspecified Established daily "Chief Executives' teleconference" between Government and industry. Included CEs from MBIE, DPMC, MoT, officials from NCMC, Auckland Council, and other government agencies, and representatives of MP, Z Energy, Mobil, Refining NZ, Air New Zealand, Qantas, BARNZ, and AIAL.
- Evening Representative from Z Energy joined NCMC.

**TUESDAY 19 September**

- Morning Representative from Refining NZ joined NCMC.
- Unspecified Stopple works (including welding) completed.
- Midday Temporary truck-loading facility at Refining NZ completed (without safety approval, final approval from fuel companies, or final testing procedure).
- Unspecified Watch Group meeting, ODESC meeting.

**WEDNESDAY 20 September**

- Unspecified Initial meeting of Fuel Security Working Group (FSWG) at Auckland Airport; chaired by the Secretary of Transport, attended by representatives from Airlines; BARNZ, Z Energy, Mobil, BP, Auckland Council, MBIE, AT Operations Centre, Refining NZ, Auckland Airport, MCDEM, and NZDF. Provided single view of fuel stocks/flows, contingency planning, facilitated information sharing between stakeholders. Daily meetings continued until 27 September.
- Unspecified BP gained permission to store fuel at Wynyard Wharf via agreement with Stolthaven.
- Unspecified Watch Group meeting. ODESC met and decided to cease meetings for the time being.

**THURSDAY 21 September**

- Unspecified HMNZS Endeavour deployed from Devonport to standby off Whangarei.
- Unspecified Damaged section of pipe replaced, mandatory 24-hour waiting period before welding could be signed off.

**FRIDAY 22 September**

- 00:01am Fuel rationing reduced to allow 50% of normal daily offtakes.
- Unspecified Watch Group meeting.
- Unspecified Refinery to JUHI transfer commenced with 2–3 trucks (approx. 150,000 L/day).
- Late evening Lloyd's approved operation of pipeline at a reduced pressure.

**SATURDAY 23 September**

- Morning NCMC informed that the welds on pipeline had passed final inspections.
- Unspecified Ship-to-tank fuel transfer (1,500,000 L) at Wynyard Wharf.
- Unspecified Refining NZ internally certified RAP to be commissioned.
- Unspecified FSWG ceased meeting in person, daily teleconference continued.

**SUNDAY 24 September**

- Unspecified Pipeline operation resumed, fuel began flowing to terminal at Wiri.
- 10:09am First batch of jet fuel arrived at Wiri.
- 6:00pm First fresh batch of jet fuel (10.7 ML) pumped through RAP (split into two at Wiri for faster access to airport).

**MONDAY 25 September**

- 00:01am Fuel rationing reduced to allow 80% of normal daily offtakes.
- Unspecified Additional truck made available for jet fuel, bringing total to 4.

## Appendix D: Chronology

6:00pm First batch of fuel from pipe certified and available for use at JUHI.  
Diesel batch available for use.

### **TUESDAY 26 September**

8:30am Second batch of fuel from pipe (5 ML) arrived at airport.

Unspecified Truck transfer from Wynyard Wharf to JUHI commenced.  
2 further trucks provided for jet transfer (bringing total to 6).

Unspecified Daily teleconferences of FSWG and Chief Executives ceased.

### **THURSDAY 28 September**

Unspecified First batch (3 ML) of fresh jet fuel available for use at JUHI.

### **SATURDAY 30 September**

00:01am Fuel rationing ceased.

Second batch (7.7 ML) of fresh jet fuel available at JUHI.